

THE ARAB REPUBLIC OF EGYPT
MINISTRY OF SUPPLY AND HOME TRADE

FINAL REPORT
ON
FEASIBILITY STUDY
FOR
COLD STORAGE CHAIN DEVELOPMENT PROJECT
(APPENDIX)

FEBRUARY 1984

JAPAN INTERNATIONAL COOPERATION AGENCY

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A. NATIONAL ECONOMY

Table A-1. Urban and Rural Distribution of Population
(Unit: Persons)

<u>Governorate</u>	<u>Urban</u>	<u>Rural</u>	<u>Total</u>
1. Cairo	5,074,016	-	5,074,016
2. Alexandria	2,317,705	-	2,317,705
3. Port-Said	262,760	-	262,760
4. Suez	193,965	-	193,965
5. Ismailia	174,211	179,764	353,975
6. Behera	595,100	1,869,345	2,464,445
7. Damietta	142,707	433,619	576,326
8. Kafr-El-Sheikh	291,614	1,115,546	1,407,160
9. Gharbia	764,307	1,528,933	2,293,240
10. Dakahlia	656,840	2,080,466	2,737,306
11. Sharkia	530,051	2,087,887	2,617,938
12. Munufia	336,623	1,374,226	1,710,849
13. Kalyubia	685,238	995,599	1,680,837
14. Giza	1,378,009	1,038,650	2,416,659
15. Fayum	275,378	866,501	1,141,879
16. Beni-Suef	276,429	833,703	1,110,132
17. Menia	430,462	1,623,643	2,054,105
18. Asyut	470,369	1,227,053	1,697,422
19. Suhag	409,520	1,515,294	1,924,814
20. Qena	392,079	1,317,220	1,709,299
21. Aswan	234,340	384,178	618,518
22. Red Sea	48,438	6,977	55,415
23. New Valley	34,769	50,406	85,175
24. Matruh	51,756	60,791	112,547
25. Sinai	9,717	-	9,717
<u>Total</u>	<u>16,036,403</u>	<u>20,589,801</u>	<u>36,626,204</u>

Source: Statistical Yearbook, July 1981

Note : Results of population Census Nov. 1976

Table does not include the population abroad (1,425,000) and population in occupied zone of Sinai (147,000).

Table A-2. Sex Distribution of Population

(Unit: Persons)

<u>Governorate</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>
1. Cairo	2,595,475	2,478,541	5,074,016
2. Alexandria	1,188,840	1,128,865	2,317,705
3. Port-Said	134,450	128,310	262,760
4. Suez	102,984	91,071	193,965
5. Ismailia	181,537	172,438	353,975
6. Behera	1,239,817	1,224,628	2,464,445
7. Damietta	293,037	283,289	576,326
8. Kafr-El-Sheikh	702,645	704,515	1,407,166
9. Gharbia	1,159,513	1,133,727	2,293,240
10. Dakahlia	1,387,748	1,349,558	2,737,306
11. Sharkia	1,334,860	1,283,078	2,617,938
12. Munufia	869,631	841,218	1,710,849
13. Kalyubia	870,116	810,721	1,680,837
14. Giza	1,242,356	1,174,303	2,416,659
15. Fayum	584,084	557,795	1,141,879
16. Beni-Suef	560,133	549,999	1,110,432
17. Menia	1,050,925	1,003,180	2,054,105
18. Asyut	873,578	823,844	1,697,422
19. Suhag	970,518	954,296	1,924,814
20. Qena	860,297	849,002	1,709,299
21. Aswan	308,165	310,353	618,518
22. Red Sea	30,238	25,177	55,415
23. New Valley	43,407	41,768	85,175
24. Matruh	56,946	55,601	112,547
25. Sinai	6,079	3,638	9,717
<u>Total</u>	<u>18,647,289</u>	<u>17,978,915</u>	<u>36,626,204</u>

Source: Statistical Yearbook, July 1981

Note : Results of population Census Nov. 1976

Table does not include the population abroad (1,425,000) and population in occupied zone of Sinai (147,000).

Table A-3. Sectoral Share in Production

	(Unit: %)						
	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
<u>I. Commodity Sector</u>							
Agriculture	22.4	22.7	20.0	20.0	20.2	20.5	16.8
Industry	39.9	36.1	33.1	31.3	30.2	29.1	27.8
Petroleum	-	3.6	3.7	4.8	5.0	5.0	11.2
Electricity	0.8	0.7	0.9	0.8	0.8	0.7	0.6
Construction	4.2	4.2	5.6	5.5	6.0	7.1	7.7
<u>Sub-total</u>	<u>67.3</u>	<u>67.3</u>	<u>63.3</u>	<u>62.4</u>	<u>62.2</u>	<u>62.4</u>	<u>64.1</u>
<u>II. Service Sector</u>							
Transportation & Communication	3.9	3.6	3.9	4.6	4.8	5.3	5.6
Finance and Trade	6.3	8.8	12.2	13.0	13.8	14.5	15.0
Housing	2.0	1.7	2.1	1.9	1.8	1.6	1.3
Public Utilities	0.4	0.3	0.3	0.3	0.2	0.2	0.2
Other Services	20.1	18.3	18.2	17.8	17.2	15.9	13.8
<u>Sub-total</u>	<u>32.7</u>	<u>32.7</u>	<u>36.7</u>	<u>37.6</u>	<u>37.8</u>	<u>37.6</u>	<u>35.9</u>
<u>III. Grand Total</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>

Source: Statistical Yearbook, July 1979 & July 1981

Table A-4. Gross Fixed Capital Formation (At Current Price)

	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
(Unit: L.E. Million)								
<u>I. Commodity Sector</u>								
Agriculture	55.1	57.6	54.2	94.5	98.5	146.4	191.3	258.0
Industry			189.9	268.8	378.7	561.0	765.0	1,010.2
Petroleum	152.9	154.3	44.1	121.9	185.9	205.7	201.0	448.0
Electricity	25.8	30.3	30.0	53.3	59.4	109.0	202.7	234.0
Construction	5.5	5.0	10.6	30.6	80.3	48.4	132.3	160.3
<u>Sub-total</u>	<u>239.3</u>	<u>247.2</u>	<u>328.8</u>	<u>587.2</u>	<u>802.8</u>	<u>1,070.5</u>	<u>1,492.3</u>	<u>2,110.5</u>
<u>II. Service Sector</u>								
Transportation & Communication	75.6	123.0	187.0	383.5	372.9	443.3	691.8	903.5
Finance and Trade	2.9	2.7	5.2	15.7	25.9	29.8	36.8	70.0
Housing	37.1	37.0	46.6	176.8	127.8	125.5	136.4	221.0
Public Utilities	15.9	22.8	28.7	46.1	45.0	66.2	95.6	165.0
Other Services	34.2	29.3	43.9	73.0	96.7	138.0	211.9	393.0
<u>Sub-total</u>	<u>165.7</u>	<u>214.8</u>	<u>311.4</u>	<u>695.1</u>	<u>668.3</u>	<u>802.8</u>	<u>1,172.5</u>	<u>1,752.5</u>
<u>III. Grand Total</u>	<u>405.0</u>	<u>462.0</u>	<u>640.2</u>	<u>1,282.3</u>	<u>1,471.1</u>	<u>1,873.3</u>	<u>2,664.8</u>	<u>3,863.0</u>

Source: Statistical Yearbook, July 1979 & July 1981

Note: Including the portion of foreign partners

Table A-5. Development of Labor

	(Unit: 1,000 Persons)						
	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
<u>I. Commodity Sector</u>							
Agriculture	4,163.8	4,212.4	4,217.9	4,067.8	4,103.5	4,135.0	4,165.0
Industry	1,112.4	1,132.6	1,158.8	1,181.4	1,228.4	1,278.1	1,332.7
Petroleum		16.9	18.3	18.6	18.7	18.9	19.2
Electricity	35.3	38.3	41.2	47.0	48.0	51.0	53.9
Construction	302.3	315.2	447.4	480.0	457.0	538.0	629.2
Sub-total	<u>5,613.8</u>	<u>5,715.4</u>	<u>5,883.6</u>	<u>5,794.8</u>	<u>5,855.6</u>	<u>6,021.0</u>	<u>6,200.0</u>
<u>II. Service Sector</u>							
Transportation & Communication	401.8	396.6	404.3	414.4	444.3	448.5	452.2
Finance and Trade	864.3	883.2	966.4	1,014.2	1,050.6	1,093.9	1,128.7
Housing	138.0	139.1	142.9	144.0	144.8	146.5	155.0
Public Utilities	41.5	43.0	50.0	53.4	54.6	60.0	64.0
Other Services	1,800.3	1,853.1	2,161.1	2,224.8	2,335.6	2,446.4	2,554.1
Sub-total	<u>3,245.9</u>	<u>3,315.0</u>	<u>3,724.6</u>	<u>3,850.8</u>	<u>4,029.9</u>	<u>4,195.3</u>	<u>4,353.0</u>
III. Grand Total	<u>8,859.7</u>	<u>9,030.4</u>	<u>9,608.2</u>	<u>9,645.6</u>	<u>9,885.5</u>	<u>10,216.3</u>	<u>10,554.0</u>

Source: Statistical Yearbook, July 1979 & 1981

Table A-6. The Balance of Trade between Egypt
and Foreign Countries

(Unit: LE 1,000)

Year	Exports	Imports	Difference + or -
1972	358,775	390,763	-31,988
1973	444,197	361,117	+83,080
1974	593,299	920,118	-326,819
1975	548,585	1,539,326	-990,741
1976	595,450	1,489,908	-894,458
1977	668,478	1,884,278	-1,215,800
1978	679,754	2,632,180	-1,952,426
1979	1,287,813	2,685,212	-1,398,399
1980	2,132,178	3,401,999	-1,269,821

Source: Statistical Yearbook, Central Agency for Public
Mobilization and Statistics

Table A-7. Composition of Exports and Imports

(Exports)

<u>Item</u>	<u>1 9 7 2</u>		<u>1 9 8 0</u>	
	(L.E/000)	(%)	(L.E/000)	(%)
Vegetable products	43,052	12.0	116,866	5.5
Mineral products	28,203	7.9	1,372,294	64.3
Textiles and textile articles	241,152	67.2	519,327	24.4
Others	46,368	12.9	123,691	5.8
<u>Grand Total</u>	<u>358,775</u>	<u>100.0</u>	<u>2,132,178</u>	<u>100.0</u>

(Imports)

<u>Item</u>	<u>1 9 7 2</u>		<u>1 9 8 0</u>	
	(L.E/000)	(%)	(L.E/000)	(%)
Living animals and its products	5,620	1.4	210,194	6.2
Vegetable products	63,522	16.3	545,117	16.0
Fats, oils	31,039	7.9	152,605	4.5
Prepared Foodstuff, beverages and tobacco	12,374	3.2	200,623	5.9
<u>Total</u>	<u>112,555</u>	<u>28.8</u>	<u>1,108,539</u>	<u>32.6</u>
Base metals	38,545	9.9	390,741	11.5
Machinery	53,539	13.7	575,813	16.9
Vehicles parts	30,943	7.9	346,890	10.2
Others	155,181	39.7	980,016	28.8
<u>Grand Total</u>	<u>390,763</u>	<u>100.0</u>	<u>3,401,999</u>	<u>100.0</u>

Source: Statistical Yearbook, Central Agency for Public Mobilization and Statistics

B. DEVELOPMENT PLAN

Table B-1. Daily Calory Intake per Capita

	<u>1969 - 71</u> (Kcal)	<u>1978 - 80</u> (Kcal)
EGYPT	2,540	2,949
ALGERIA	1,866	2,404
ETHIOPIA	2,028	1,729
SOUTH AFRICA	2,767	2,827
SUDAN	2,082	2,371
TANZANIA	2,021	2,025
IRAN	2,199	2,912
IRAQ	2,244	2,643
ISRAEL	3,024	3,045
SYRIA	2,493	2,863
LEBANON	2,503	2,496
JAPAN	2,741	2,916
INDIA	1,999	1,998
PAKISTAN	2,195	2,300
FRANCE	3,371	3,390
ITALY	3,496	3,650
UK	3,352	3,316
USA	3,462	3,652
BRAZIL	2,493	2,517
PERU	2,254	2,166

Source: FAO Production Yearbook 1981

Table B-2. Annual Food Consumption
per Capita

(Unit: kg)

<u>Country</u>	<u>Year</u>	<u>Meat</u>	<u>Marine Products</u>	<u>Dairy Product</u>
U.S.A.	1975	110.1	6.9	246.1
Sweden	1975	60.9	23.5	359.5
Canada	1975	94.1	5.8	302.4
West Germany	1975	90.4	9.0	270.2
France	1975	99.1	18.7	320.6
Japan	1977	28.6	34.7	57.0
Argentina	1972/74	98.2	4.7	82.1
Zudia	1972/74	1.5	2.3	33.8

Data Source:

Food Consumption Statistics 1970 - 1975 O.F.C.D.

Provisional Food Balance Sheets F.A.O.

(Unit: kg)

Table B-3. Annual Share per Capita from Foodstuffs in A.R.E.

Year	Seeds (Grains)	Starchy Products	Sugar & Sweets	Pulses & Nuts	Fresh Vegetables	Fruits	Meat and Poultry	Fish	Dairy Products	Eggs	Vegetable oils
1952	169.5	7.7	16.0	10.7	36.3	36.4	9.1	2.3	48.9	0.7	3.0
1969	216.9	10.9	17.0	9.2	98.8	52.6	8.8	2.4	48.1	1.3	5.6
70	218.2	11.1	18.0	11.9	91.1	57.2	8.8	2.2	48.5	1.4	6.4
71	225.8	12.6	18.5	9.9	89.3	51.2	9.1	2.2	48.8	1.4	8.5
72	231.0	9.5	21.9	10.2	92.3	54.4	10.9	2.2	49.3	1.5	9.1
73	244.6	16.8	22.3	13.1	85.4	58.8	10.9	2.2	48.5	1.5	9.9
74	249.3	16.1	23.4	12.0	92.7	66.4	10.9	2.6	48.2	1.5	10.9
75	254.4	13.1	27.4	11.7	96.0	63.9	10.6	2.9	48.2	1.8	11.3
76	275.9	16.8	28.8	12.8	99.3	63.1	10.2	3.7	50.4	1.5	11.0
77	266.1	20.4	28.8	9.1	107.3	58.0	10.6	3.3	48.2	1.8	11.0
78	281.1	19.0	26.3	10.2	90.2	62.4	12.0	4.7	47.5	3.3	12.3

Source: Statistical Indicators, Central Agency for Public Mobilization & Statistics.

Table B-4. Daily Share per Capita from Foodstuffs in A.R.E. (1)

Year	(Proteins)										(Unit: g)	
	Seeds (Grains)	Starchy Products	Sugar	Pulses & Nuts	Fresh Vegeta- ble	Fruits	Meat & Poultry	Fish	Dairy Products	Eggs	Vegetable Oils	Total
1952	47.0	0.3	-	6.7	1.8	1.4	4.8	1.2	5.1	0.2	-	68.5
1969	60.1	0.5	-	5.6	4.8	1.7	4.0	1.2	5.0	0.4	-	83.3
70	60.2	0.5	-	7.9	4.4	1.9	4.1	1.1	5.0	0.5	-	85.1
71	62.3	0.7	-	6.7	4.3	1.7	4.1	1.1	5.1	0.5	-	86.5
72	58.0	1.0	-	6.0	5.0	3.0	6.0	1.0	6.0	0.5	-	86.5
73	60.0	1.0	-	8.0	4.0	3.0	5.0	1.0	5.0	1.0	-	88.0
74	60.4	0.8	-	7.0	4.2	2.5	5.3	1.5	5.3	0.5	-	88.8
75	61.5	0.7	-	7.3	4.5	2.4	5.3	1.5	5.3	0.6	-	89.1
76	67.1	0.9	-	8.0	4.5	2.3	5.3	2.0	5.6	0.5	-	96.2
77	74.1	1.2	-	5.7	5.0	1.9	4.8	1.0	5.7	0.6	-	100.0
78	86.3	1.2	-	6.1	4.3	2.0	5.7	1.1	5.6	1.1	-	113.8

Source: Statistical Indicators, Central Agency for Public Mobilization & Statistics.

Table B-5. Daily Share per Capita from Foodstuffs in A.R.E. (2)

Year	(Calories)										(Unit: cal)			Total
	Seeds (Grains)	Starchy Products	Sugar	Pulses & Nuts	Fresh Vegeta- ble	Fruits	Meat & Poultry	Fish	Dairy Products	Eggs	Vegetable Oils			
1952	1,643	20	165	107	31	103	53	8	119	3	72	2,324		
1969	2,109	28	175	90	78	100	44	9	118	6	136	2,893		
70	2,122	29	185	116	70	110	44	8	119	6	154	2,963		
71	2,197	32	190	97	70	79	46	8	119	6	206	3,050		
72	2,248	25	218	97	81	85	74	6	113	6	221	3,174		
73	2,375	46	222	122	74	84	64	5	112	6	233	3,343		
74	2,423	45	233	113	83	117	62	7	111	6	265	3,465		
75	2,472	38	268	109	83	113	59	7	111	7	274	3,541		
76	2,685	47	282	116	88	112	58	9	116	6	265	3,784		
77	2,592	52	282	88	85	116	53	6	112	8	265	3,659		
78	2,743	48	270	98	71	118	64	8	111	10	309	3,855		

Source: Statistical Indicators, Central Agency for Public Mobilization & Statistics.

Table B-6. Daily Share per Capita from Foodstuffs in A.R.E. (3)

Year	(Fats)										(Unit: g)	
	Seeds (Grains)	Starchy Products	Sugar	Pulses & Nuts	Fresh Vegeta- ble	Fruits	Meat & Poultry	Fish	Dairy Products	Eggs		Vegetable Oils
1952	11.6	-	-	1.8	0.3	0.5	3.6	0.4	8.2	0.2	8.1	34.7
1969	13.9	-	-	1.1	0.6	0.7	2.8	0.4	8.2	0.4	15.4	43.5
70	13.6	-	-	1.5	0.5	0.7	2.8	0.3	8.2	0.4	17.4	45.4
71	14.0	-	-	1.4	0.4	0.6	2.9	0.3	8.3	0.4	23.3	51.6
72	15.0	-	-	1.7	0.4	0.6	6.0	0.3	8.0	0.5	25.0	57.5
73	15.0	-	-	2.0	1.0	1.0	4.0	0.5	7.0	1.0	26.0	57.5
74	15.7	-	-	1.1	0.4	0.7	3.8	0.5	7.3	0.5	30.0	60.0
75	16.1	-	-	1.0	0.6	0.7	3.6	0.5	7.3	0.5	31.0	61.3
76	18.0	-	-	1.0	0.6	0.7	3.1	0.5	7.6	0.5	30.0	62.0
77	16.2	-	-	0.9	0.6	0.9	3.3	0.2	7.4	0.6	30.0	60.1
78	17.8	-	-	1.0	0.5	0.9	4.2	0.4	7.3	1.0	30.0	68.1

Source: Statistical Indicators, Central Agency for Public Mobilization & Statistics.

B-7. Demand Forecast for Cheese Yearly
Consumption per Capita Until 2000

(1) Consumption of Milk and Milk Products

The consumption of milk and milk products in total from 1969 to 1978 is tabulated below;

(Unit: kg)

<u>Year</u>	<u>Per Capita Consumption</u>
1969	48.1
1970	48.5
1971	48.8
1972	49.3
1973	48.5
1974	48.2
1975	48.2
1976	50.4
1977	48.2
1978	47.5

Source: Statistical Indicators

Note: No data on the consumption of cheese only
are available.

(2) Regression Equation

From the above trend of consumption, the following regression equation is obtained as regards the future consumption of milk and milk products.

$$y = -0.0188x + 49.9503 \quad (1969 - 78)$$

(3) Demand Forecast by the Regression Equation

The future demand for milk and milk products until 2000 is forecast by the regression equation as follows;

<u>Year</u>	<u>Demand</u>
1985	48.4 kg
1990	48.3
1995	48.2
2000	48.1

(4) Trend in Domestic Production, Import, and Per Capita Consumption of Cheese

The past trend in domestic production, import and per capita consumption of cheese is as follows;

<u>Year</u>	(Unit: kg)				
	<u>Domestic Production</u> (A)	<u>Import</u> (B)	<u>Total Demand</u> (A+B=C)	<u>Population</u> (D)	<u>Per Capita Consumption</u>
1970	177,716	1,524	179,240	31,830	5.6
1971	180,025	1,368	181,393	32,556	5.6
1972	180,834	792	181,626	33,298	5.5
1973	215,000	653	215,653	34,057	6.3
1974	218,740	2,130	220,870	34,834	6.3
1975	223,460	3,909	227,369	35,628	6.4
1976	228,180	8,891	237,071	36,416	6.5
1977	229,240	7,841	237,081	37,350	6.3
1978	233,960	12,207	246,167	38,380	6.4
1979	238,680	15,067	253,747	39,549	6.4

(5) Demand Forecast

The demand for cheese from 1985 to 2000 is forecast at 6.4 kg throughout the period.

B-8. Demand Forecast for Butter Yearly
Consumption per Capita Until 2000

(1) Past Trend

The following table shows the past trend in domestic production, import and per capita consumption of butter from 1970 to 1979;

Year	Domestic Production (A) ton	Import (B) ton	Total Demand (A+B=C) ton	Population (D) '000 persons	Per Capita Consumption (C/D) kg
1970	56,331	3,392	59,723	31,830	1.9
1971	57,961	3,045	61,007	32,556	1.9
1972	59,594	1,763	61,357	33,298	1.9
1973	61,350	1,453	61,803	34,057	1.8
1974	63,150	4,740	67,890	34,834	1.9
1975	64,516	8,699	73,215	35,628	2.0
1976	65,882	19,786	86,668	36,416	2.3
1977	64,950	17,449	82,399	37,350	2.2
1978	66,316	27,174	93,490	38,380	2.4
1979	67,682	22,008	89,690	39,549	2.3

Note:

1. Figures on the domestic production are derived from FAO Production Yearbook.
2. The imported quantities in 1978 and 1979 are the actual figures while those from 1970 to 1977 were estimated based on the proportion of 1978, since the details of dairy products are not available.
3. The population refers to residents in Egypt only. Since the 1970 - 75 data are on the total population, 3.7 percent of the total population that accounts for Egyptians abroad in 1976 has been deducted.
4. Data only on butter are not available.

(2) Regression Equation

From the above-table, the regression equation as regards the consumption of butter is obtained as follows;

$$y = 0.0618x - 2.5455$$

(3) Demand Forecast by the Regression Equation

By the regression equation, the future demand for butter is forecast as follows;

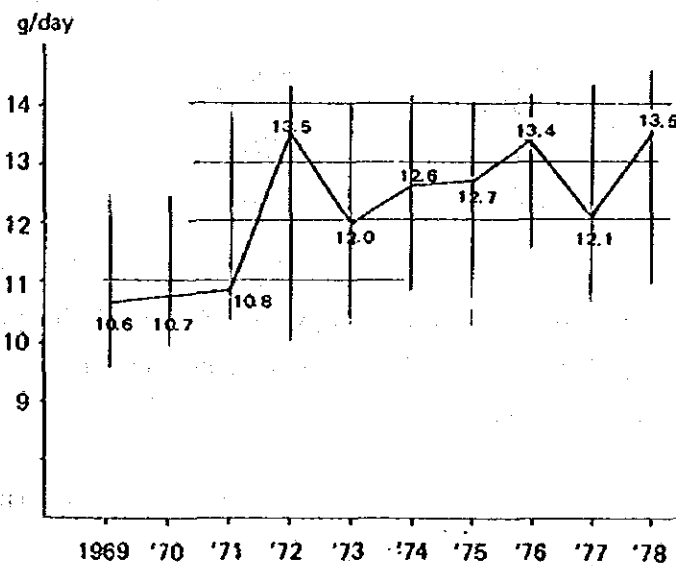
<u>Year</u>	<u>Demand</u>
1985	2.7 kg
1990	3.0
1995	3.3
2000	3.6

B-9. Daily Intake of Animal Protein per Capita
- Forecast Until Year 2000 -

Estimate-I

(1) Past Trend

The past trend of the daily intake of animal protein per capita (total of meat, chicken, fish, milk, milk products, and egg) is obtained by the regression analysis as follows;



Note: * The peak consumption of 13.5 grams per day was recorded in 1972 because of an increased intake of meat

Source: Statistical Indicators, Central Agency for Public Mobilization and Statistics

(2) Regression Equation

The regression equation obtained in the above-mentioned analysis is as follows:

$$y = 0.2855x - 8.7909$$

(3) Demand Forecast for Animal Protein

By the regression equation, the daily demand of animal protein per capita until 2000 is forecast as follows:

(Unit: Gram/person)

<u>Year</u>	<u>Demand</u>
1985	15.5
1990	16.9
1995	18.3
2000	19.8

Estimate-II

Based on the estimated consumption of animal foodstuffs in 2000, the daily intake of animal protein per capita in the same year is forecast as follows;

(Unit: gram)

	<u>Average in 1976-78</u>		<u>Forecast for in 2000</u>	
	<u>Consumption of Animal Foodstuffs</u>	<u>Intake of Animal Protein</u>	<u>Consumption of Animal Foodstuffs</u>	<u>Intake of Animal Protein</u>
Meat & Chicken	29.9	5.3	51.8 - 55.6	9.2 - 9.9
Fish	10.7	1.4	24.7 - 25.8	3.2 - 3.4
Cheese	17.5	3.4	17.5	3.4
Butter	6.3	-	9.3	-
Milk & Milk Products	-	2.2	-	2.2
Egg	6.0	0.7	14.5	1.7
<u>Total</u>		<u>13.0</u>		<u>19.7 - 20.6</u>

Note: ° The daily consumption per capita is computed by dividing the annual consumption per capita by 365 days.

- ° The rate of animal protein intake out of animal foodstuff consumption was computed for each foodstuff based on the 1976 - 78 average. Assuming that the rate would not vary, the daily intake of animal protein in year 2000 was calculated.

Table B-7. Cropping Area

(unit: 1,000 Feddans)

	Field Crops			Orchard	Total
	Winter Crops	Summer Crops	Nile Crops		
1952	4,364	3,026	1,824	94	9,308
1972	4,911	5,078	595	253	10,837
1973	4,943	5,075	648	258	10,924
1974	4,980	5,101	667	273	11,021
1975	5,069	5,083	723	285	11,160
1976	5,042	5,122	734	313	11,211
1977	4,958	5,082	750	321	11,111
1978	5,029	4,968	813	332	11,142
1979	5,063	5,051	781	342	11,237
1980	4,929	5,038	803	360	11,130

Source: Statistical yearbook

Table-8. Area Cultivated with Clover

(Unit: 1,000 Feddans)

<u>Year</u>	<u>Area</u>
1952	2,202
1975	2,812
1976	2,757
1977	2,854
1978	2,782
1979	2,777
1980	2,711

Source: Statistical Yearbook 1981

Table B-9, Estimation of Number of Livestock to be Slaughtered

Livestock	(unit: 1,000 heads)							
	Simple Regression Equation			Quadratic Regression Equation				
	1985	1990	1995	2000	1985	1990	1995	2000
Oxen	0	0	0	0	0	0	0	0
Cows	37	38	38	39	74	106	146	192
Buffaloes	95	98	102	106	130	165	207	256
Veals	322	332	341	351	311	311	309	305
Calves	448	489	526	565	570	716	886	1,080
Sheep	356	332	308	283	460	526	612	719
Goats	25	26	27	28	23	23	22	22
Pigs	58	63	69	75	71	88	108	131
Camels	54	57	60	62	16	0	0	0
Total	<u>1,395</u>	<u>1,435</u>	<u>1,471</u>	<u>1,509</u>	<u>1,655</u>	<u>1,935</u>	<u>2,290</u>	<u>2,705</u>

Figure B-1. Number of Livestock

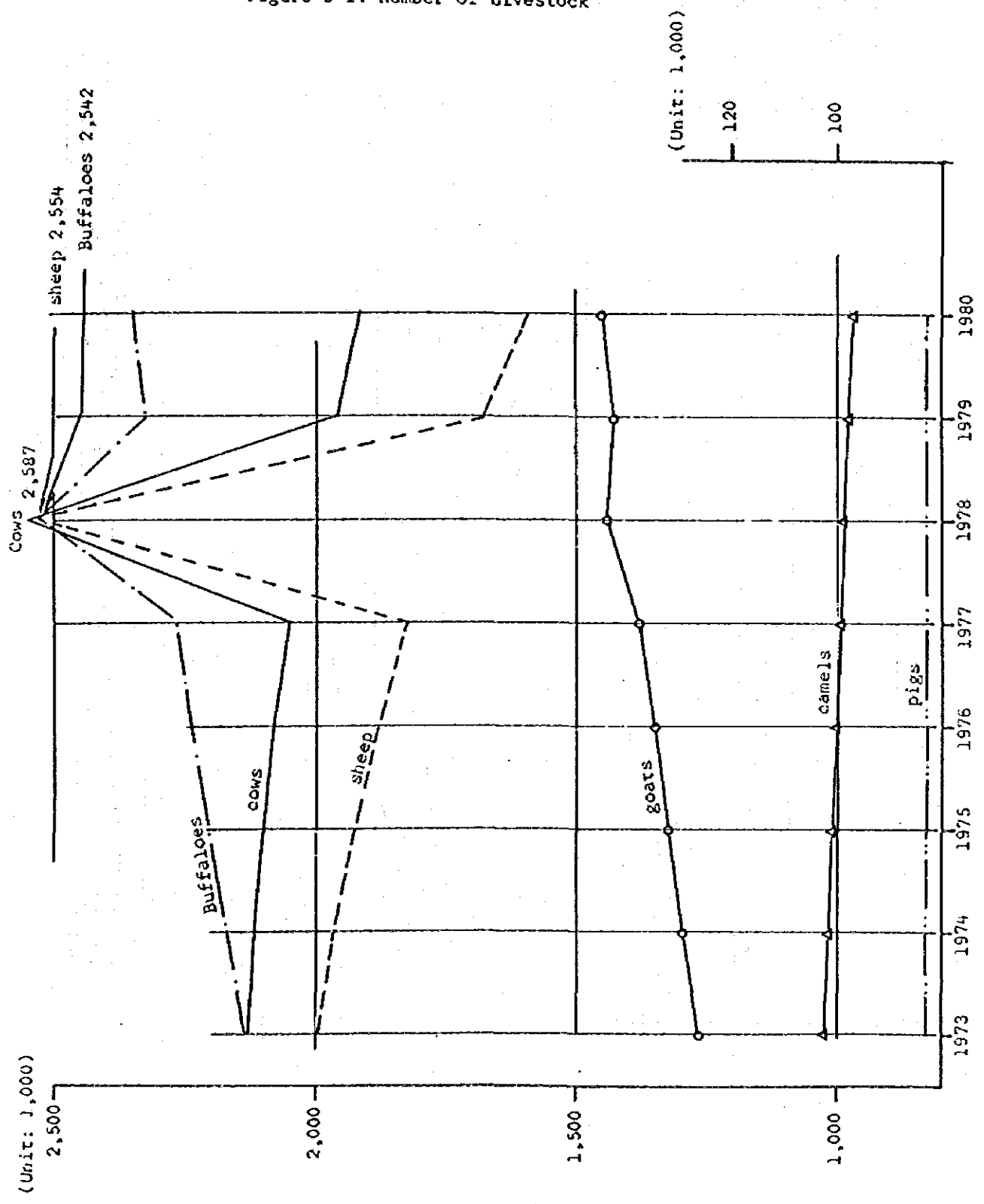


Figure B-2. Number of Slaughtered Livestock

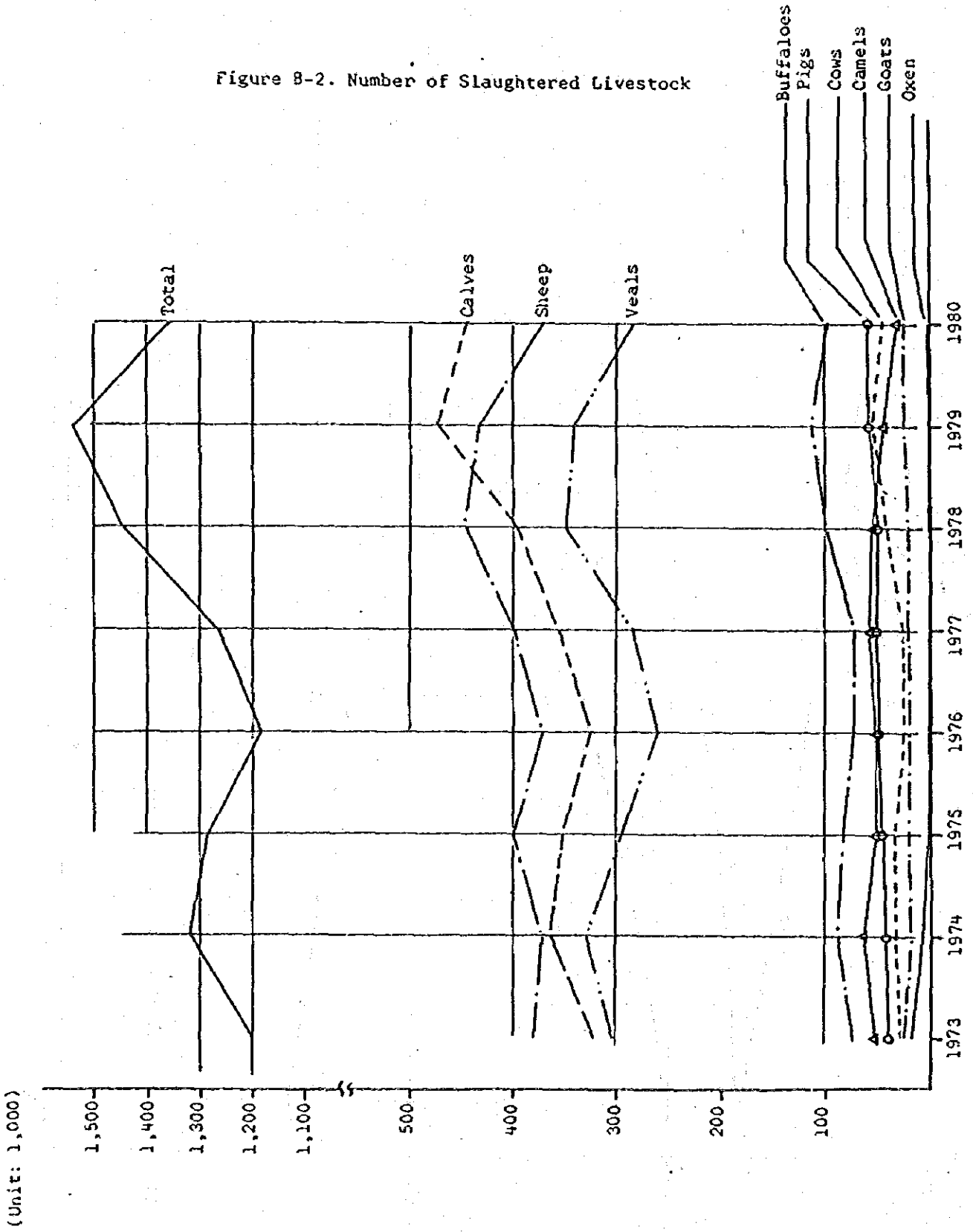


Table B-10. Estimation of Regression Equation

<u>Year</u>	<u>Number of Slaughtered Livestock</u> (1,000 heads)	<u>Meat Production</u> (1,000 t)
1973	1,195	295
1974	1,256	301
1975	1,232	309
1976	1,128	318
1977	1,209	319
1978	1,392	323
1979	1,494	335

Note: The meat production excludes chicken and the number of slaughtered livestock excludes camels.

Source: Meat Production from FAO Production Yearbook, Number of Slaughtered Livestock from Statistical Yearbook, Central Agency for Public Mobilization and Statistics, July 1981.

Regression Equation

Simple regression equation $Y = 0.06989x + 225.36741$

Quadratic regression equation $Y = 0.00051x^2 - 1.26446x + 1096.7979$

Table B-11. Comparison of Estimated Results

Simple Regression Equation $Y = 0.06989x + 225.36741$

Correlation Coefficient 0.65

(Unit: 1,000 tons)

<u>Year</u>	<u>Actual Result</u>	<u>Estimate</u>
1973	295	308
1974	301	313
1975	309	311
1976	318	304
1977	319	309
1978	323	322
1979	335	329

Quadratic Regression Equation $Y = 0.00051x^2 - 1.26446x + 1096.7979$

Correlation Coefficient 0.80

(Unit: 1,000 tons)

<u>Year</u>	<u>Actual Result</u>	<u>Estimate</u>
1973	295	308
1974	301	307
1975	309	307
1976	318	314
1977	319	307
1978	323	317
1979	335	337
1985	-	311
1986	-	312
1990	-	315
1995	-	320
2000	-	326

Table B-12 Forecast of Chicken Production

(Unit: 1,000 tons)

(1) Past Trend

<u>Year</u>	<u>Chicken Production</u>
1970	76
1971	79
1972	82
1973	80
1974	84
1975	86
1976	88
1977	102
1978	135
1979	139

Source: FAO Production Yearbook

(2) Regression Equation

$$Y = 6.5758x - 394.7939$$

(3) Forecast

<u>Year</u>	<u>Chicken Production</u>
1985	164
1986	171
1990	197
1995	229
2000	262

Table B-13. Forecast of Cheese and Butter Production

(1) Past Trend

(unit: ton)

<u>Year</u>	<u>Cheese</u>	<u>Butter</u>
1970	177,716	56,331
1971	180,025	57,962
1972	180,834	59,594
1973	215,000	61,350
1974	218,740	63,150
1975	223,460	64,516
1976	228,180	65,882
1977	229,240	64,950
1978	233,960	66,316
1979	238,680	67,682

Source: FAO Production Yearbook

(2) Regression Equation

$$\text{Cheese } Y = 7348.5515x - 334883.5878$$

$$\text{Butter } Y = 1226.5394x - 28603.8848$$

(3) Forecast

<u>Year</u>	<u>Cheese</u>	<u>Butter</u>
1985	289,743	75,651
1986	297,092	76,878
1990	326,486	81,784
1995	363,228	87,917
2000	399,971	94,050

Table B-14. Milk Production

(Unit: 1,000 tons)

<u>Year</u>	<u>Cow Milk</u>	<u>Buffalo Milk</u>	<u>Sheep Milk</u>	<u>Goat Milk</u>	<u>Total</u>
1970	572	1,005	15	6	1,598
1971	580	1,020	16	6	1,622
1972	590	1,035	17	6	1,648
1973	609	1,087	18	7	1,721
1974	618	1,113	19	7	1,757
1975	635	1,150	19	7	1,811
1976	655	1,210	20	7	1,892
1977	638	1,182	19	8	1,847
1978	660	1,210	20	8	1,898
1979	683	1,238	22	8	1,951

Source: FAO Production Yearbook

Table B-15. Forecast of Fish Production

(1) Past Trend

(Unit: tons)

<u>Year</u>	<u>Inland Area</u>	<u>Marine Area</u>	<u>All Areas</u>
1970	53,700	27,200	80,900
1971	53,200	34,400	87,600
1972	55,000	38,800	93,800
1973	65,700	27,800	93,500
1974	68,700	27,465	96,165
1975	80,664	25,910	106,574
1976	72,276	30,488	102,764
1977	74,959	29,582	104,541
1978	89,172	20,905	110,077
1979	105,181	37,479	142,660

Source: FAO Production Yearbook

1978 and 1979 data were quoted from Statistics of Fish Production in ARE year 1979, Central Agency for Public Mobilization & Statistics, August 1981.

(2) Regression Equation

$$\text{All Areas } Y = 4679.6303x - 261673.7575$$

(3) Forecast

<u>Year</u>	<u>Inland Area</u>	<u>Marine Areas</u>	<u>All Areas</u>
1985	125,735	27,359	153,094
1986	130,866	27,107	157,973
1990	151,391	26,101	177,492
1995	177,049	24,842	201,891
2000	202,706	23,583	226,289

Table B-16. Maritime Traffic at Egyptian Ports
(Arriving Vessels)

	<u>Unit</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>
<u>Alexandria</u>							
Arriving Vessels	No.	3,154	3,046	3,051	2,992	3,237	3,342
Net Tonnage	000 tons	10,910	10,504	11,433	10,349	12,844	13,813
Unloaded Cargo	000 tons	12,011	10,027	10,564	10,826	11,303	11,173
Arriving Passengers	000	131	117	149	129	131	112
<u>Port Said</u>							
Arriving Vessels	No.	248	524	876	952	906	892
Net Tonnage	000 tons	755	4,121	4,259	4,922	3,382	4,041
Unloaded Cargo	000 tons	930	1,618	2,096	2,585	2,505	3,507
Arriving Passengers	000	5	24	48	33	15	8
<u>Suez</u>							
Arriving Vessels	No.	188	377	483	563	1,178	614
Net Tonnage	000 tons	511	1,182	1,510	1,936	2,744	2,045
Unloaded Cargo	000 tons	124	345	832	840	592	1,129
Arriving Passengers	000	40	42	61	100	107	63
<u>Total of Ports</u>							
Arriving Vessels	No.	3,590	3,947	410	4,507	5,321	4,848
Net Tonnage	000 tons	12,176	15,807	17,202	17,207	18,970	19,899
Unloaded Cargo	000 tons	13,065	11,990	13,492	14,251	14,400	15,809
Arriving Passengers	000	176	183	258	262	253	183

Source; Statistical Yearbook July, 1981

Table B-17. Maritime Traffic at Egyptian Ports
(Departing Vessels)

	<u>Unit</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>
<u>Alexandria</u>							
Departing Vessels	No.	2,980	2,863	2,936	2,675	2,960	2,956
Net Tonnage	000 tons	9,731	9,721	10,852	8,955	10,468	10,090
Loaded Cargo	000 tons	1,932	1,932	1,544	1,179	1,437	1,484
Departing Passenger	000	101	95	130	109	97	77
<u>Port Said</u>							
Departing Vessels	No.	157	410	777	712	618	672
Net Tonnage	000 tons	749	3,337	4,761	3,037	2,364	3,107
Loaded Cargo	000 tons	55	106	267	227	122	313
Departing Passenger	000	1	35	60	43	26	10
<u>Suez</u>							
Departing Vessels	No.	205	363	450	506	605	580
Net Tonnage	000 tons	575	1,184	1,301	1,342	1,871	1,760
Loaded Cargo	000 tons	51	109	671	244	114	165
Departing Passenger	000	48	52	51	50	111	47
<u>Total of Ports</u>							
Departing Vessels	No.						
Net Tonnage	000 tons						
Loaded Cargo	000 tons	2,038	2,147	2,482	1,650	1,673	1,962
Departing Passenger							

Source; Statistical Yearbook July, 1981

B-22. Imported Cold Foods and Storage Temperature

Storage Temperature by Cold Foods

Each cold food has its own optimum storage temperature though it differs by storage periods as tabulated below. Storage temperatures are roughly divided into Class F of below -20°C and Class C ranging from $+10^{\circ}\text{C}$ to -20°C . Class F is for storing frozen foods whereas Category C is for storing cold foods. In general, the optimum storage temperature of frozen foods varies from -20°C to -30°C .

The proposed cold storages will handle meat, chicken, fish and butter & cheese. Frozen foods selected in the Project are meat, chicken, and fish whereas cold foods are butter and cheese. Butter, though being a dairy product, shall be stored at a temperature under Category F if it is stored for a long period. However, five-time rotation per year is assumed in operating the proposed cold storages. With a storage period of two to three months, butter could be stored at a temperature under Class C so far as the proposed cold storages are concerned.

Storage Temperature

Food Item	Short-term Storage		Long-term Storage		Storage Period
	Temperature ($^{\circ}\text{C}$)	Humidity (%)	Temperature ($^{\circ}\text{C}$)	Humidity (%)	
Butter	+ 7.2	60 - 80	- 23.5	65 - 80	12 months
Cheese	+ 4.4	70 - 80	0	70 - 80	12 months
Margarine	+ 7.2	60 - 80	- 23.5	65 - 85	12 months
Beef (raw)	+ 1.7	80 - 87	0	80 - 87	1 - 6 weeks
Beef (frozen)			- 23.5	80 - 90	9 - 12 months
Mutton (raw)	+ 2.2	80 - 85	0	80 - 85	5 - 12 days
Mutton (frozen)			- 23.5	80 - 90	8 - 10 months
Pork (law)	+ 1.7	70 - 87	0	70 - 87	3 - 7 days
Pork (frozen)			- 23.5	80 - 90	4 - 8 months
Fish (raw)	+ 1.7	80 - 85	+ 0.6	80 - 90	15 days
Fish (frozen)			- 17.8	80 - 90	8 - 10 months
Chicken (raw)	0 - +1	85 - 90			3 - 5 days
Chicken (frozen)			- 20.0		9 - 12 months

Note: The short storage term means a half period of the long storage term of each food item.

Source: "Practical Note on Cold Storage" and "Pocket Book on Ventilation in Cold Storage", both Japanese Edition

Operation of Cold Storages

It is assumed that GERCO will have a cold storage capacity of 300,000 tons in total in 1986. The following cold foods are forecast to be imported in 1986.

Forecast of Imported Cold Foods in 1986

<u>Item</u>	<u>Capacity</u> (1,000 tons)	<u>Ratio</u> (%)	<u>Remarks</u>
Meat and Chicken	142	48	Class F
Fish	106	35	Class F
Cheese and Butter	52	17	Class C
<u>Total</u>	<u>300</u>	<u>100</u>	

Note: The figures are the smallest amount estimated and are converted into boneless meat.

As observed, 83 percent of imported foodstuffs will be stored in Class F cold rooms whereas the remaining 17 percent in Class C cold rooms. The selection of types of cold storage will be affected to a great extent by the types of food items to be stored, its capacity, as well as the import of cold foods.

Taking this into consideration, the proposed cold storages will be all provided with refrigeration equipment convertible from a Category to the other.

In general, cold storages aim to store cold foods for a period without deteriorating the quality of them. The optimum temperature for each food therefore must remain constant in cold rooms. Cold room of a convertible type is advantageous in storing various foods though careful operation and management

are necessary for this type. Details of the cold storage management are mentioned in the Main Report.

Due attentions was paid to the following in adopting the convertible type;

- 1) Frozen foods account for 83 percent of the imported cold foods. For smooth operation, it is desirable that all the proposed cold storages will be of Class F type.
- 2) Butter and cheese of 52,000 tons in total will be stored in a Class C storage. The convertible type (to class C) will play a great role for the smooth import of cold foods.
- 3) As for the importation of meat, it is considered that ARE would purchase a great deal of a single food item at one time. It is most probable that the Government of ARE would purchase cold foods to be stored Class in either one of the two storage types, Class C or Class F. For this reason, GERCO strongly requested the Study Team of adopting the convertible type in the Project planning.
- 4) Technical difficulties would hardly be encountered in erecting the cold storages of a convertible type.
- 5) The cost of erecting a convertible type cold storage is higher by only about one percent than that of a non-convertible type, provided that the capacity is the same. For instance, the proposed cold storage at Alexandria has a capacity of 3,000 tons. On the assumption that its two cold rooms are of convertible type and the other two are of non-convertible type, the cost required to remodel the non-convertible rooms to convertible ones is estimated as follows;

(Unit: million Japanese yen)

<u>Description</u>	<u>Cost</u>	<u>Ratio</u> (%)
A. Equipment and machinery cost such as refrigerating equipment and power generator	67.6	29.8
B. Materials cost like valves and pipes	48.6	21.5
C. Construction and administration costs	108.4	47.8
D. Remodelling cost (evaporation pressure control valves)	2.0	0.9
<u>Total</u>	<u>226.6</u>	<u>100.0</u>

B-23. Sterilized Defreezing Equipment

The sterilized defreezing equipment will be introduced to defreeze frozen meat. A meat temperature of about -20°C at its center will be raised to a range of -2°C to $+5^{\circ}\text{C}$ by sterilized defreezing equipment so as to separate meat from bones. The meat temperature inclusive of processed meat like ham and frozen one has to be kept in a range of -2°C to $+5^{\circ}\text{C}$ until the processing is completed. It is desirable that the temperature in processing rooms is kept at 18°C to 15°C so as to complete the meat processing before the meat temperature rises over 5°C since a higher meat temperature than this range results in an increase of drip. A careful study should be carried out on defreezing methods that directly affect the quality of stored foods and the yield rate in processing.

The use of defreezing equipment is advantageous in comparison with defreezing by water tanks as follows;

Defreezing Temperature

(a) Defreezing Equipment

A high humidity and a low temperature of the air in processing rooms make dew condense on the surface of frozen meat. The latent heat in dew condensation is utilized for defreezing frozen meat. (The surface of frozen meat is frosted). The heat effectively conducts from the surface to inside of meat, resulting in equalized defreezing of the frozen meat.

(b) Water Tanks

The equalized defreezing of frozen meat in a short time is difficult. Water defreezes the frozen meat only on its surface, if the defreezing time is insufficient.

Water

(a) Defreezing Equipment

Defreezing equipment requires only 100 lit/day of water in defreezing one ton of frozen meat for supplementing cooling water and for obtaining a high humidity. A discharge through drains to the treatment device of exhausted water is very small in quantity.

(b) Water Tanks

Water of five tons with a temperature at 15°C is necessary in defreezing one ton of frozen meat.

Yield Rate in Processing

(a) Defreezing Equipment

The drip rate is small at around one percent since defreezing is made in the clean air with a high humidity and a low temperature, resulting in an extremely high yield rate in processing in comparison with that by the water tank defreezing. The loss of weight in the course of drying hardly takes place. Furthermore, the quality of defrozen meat by this equipment is high.

(b) Water Tanks

Water deprives meat of its water-soluble protein by about 20%, resulting in the deterioration of quality and in a low yield rate in processing. It is noted that the water-soluble protein of meat is replaced by water and the yield rate seems high in appearance.

Germ Protection

(a) Defreezing Equipment

The air-cleaners prevent dust and germs from intruding into processing rooms. Frozen meat is exposed to the sterilized air, resulting in the prevention of various germs from multiplication.

(b) Water Tanks

Frozen meat is submerged under water with a temperature ranging from 15°C to 10°C, resulting in the multiplication of various germs.

Storing

(a) Defreezing Equipment

The defreezing temperature can be easily controlled, and the sterilized air makes possible the storage of defrozen meat for a relatively long period.

(b) Water Tanks

Meat shall be processed immediately after its defreezing. Thus, it is difficult to meet the fluctuating demand for processed meat.

Management

(a) Defreezing Equipment

Defrozen meat can be stored without freezing it again, resulting in easy quality control as well as smooth operation of cold storages.

(b) Water Tanks

Frozen meat has to be submerged in water tanks from the previous day of processing, and the meat processing is made everyday throughout the year to meet the daily demand. To store defrozen meat, a building is necessary in addition to that of the cold storage.

Equipment

(a) Defreezing Equipment

The initial investment cost is high. However, the running cost is low.

(b) Water Tanks

The initial investment cost is low. However, the running cost becomes high for the supply and treatment of water.

B-24. El Dekihla Cold Storage at Alexandria

1) Location

The proposed site is located at El Dekihla near the site proposed for the construction of new port. The site has the length of 150 m and the width of 130 m.

2) Facilities

El Dekihla cold storage will have the following characteristics;

a) Cold Storage Capacity

El Dekihla cold storage will have the following total storage capacity;

<u>Room Capacity</u> (tons/room)	<u>Room Number</u>	<u>Total Capacity</u> (tons)
1,500	3	4,500
750	2	1,500
<u>Total</u>	<u>5</u>	<u>6,000</u>

b) Meat Processing Capacity

° One-shift

Bone meat	5 tons per day
Boneless meat	20
<u>Total</u>	<u>25 tons per day</u>

° Two-shifts

25 tons per day x 2	<u>50 tons per day</u>
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° Standard Room Temperatures

<u>Room</u>	<u>Temperatures</u>	<u>Remarks</u>
Freezing room	- 25°C to 0°C	Convertible to either Class F or C
Meat processing room	+ 18°C	
Products storage room	- 25°C	
Anteroom	+ 10°C	

3) Design Concept

a) Schematic Plan

As mentioned in Main Report, many heavy trucks for long distance transportation to Cairo and the light trucks for local distribution will arrive and depart at Amria cold storage. It is, therefore, important, in designing schematically the compound of this cold storage, to secure smooth flow of both types of trucks in the compound. Taking it into consideration, the building is designed to be located at the heart of the site so that the platform, truck berth and parking area for heavy trucks will be provided at the left side of the building while these facilities for light ones at the right side. By this way, the truck zone for heavy trucks is separated from that for light trucks although the facilities of the light truck zone are designed to be available for loading and unloading from and onto heavy trucks in emergency. The service roads will go around the building for smooth operation of cold storages, equipment, and facilities.

b) Building Plan

The basic requirements in building planning are as follows;

- To meet the local natural conditions inclusive of climate conditions;
- To simplify the flow patterns of both the cold foods and trucks;
- To simplify and make the building compact in design and planning for the above-mentioned objective and for easy access;
- To provide each working zone with an independent entrances to be exclusively used by purposes;
- To minimize energy consumption; and,
- To secure smooth operation and maintenance.

4) Architectural Plan

a) Zone Plan

Amria cold storage will have five working zones; the handling zone (platform), cold rooms zone, meat processing zone, management office zone, and machine zone and the details are as follows;

° Handling zone

An open-type platform will be constructed to handle a variety of goods in a small lot by forklift.

° Meat processing zone

An anteroom should be provided between the processing zone and storage room zone so that such separation can keep sanitary working environment which is the absolute prerequisites of the meat processing works. Through the anteroom at the side of cold rooms, meat to be processed will be carried into the processing room from cold rooms. After processing, meat will be frozen again and stored in the products storage room, and hauled to the platform for loading onto light trucks through the anteroom at the side

of this platform for forwarding it to retailers by light trucks.

° Machine room

The machine room will be placed adjacently to the heavy trucks' platform to minimize piping works for refrigerant.

b) Cross-sectional Design

The ceiling of cold rooms is determined at eight meters high from floor as mentioned in Section "Concept of Cold Storage" in Main Report. Loading and unloading in the freezing room and products storage room will be made by manpower. The ceiling of these rooms is determined at three meters high from floor.

5) Refrigeration, Water Supply, Sewage and Electric Systems

a) Refrigeration System

The following machines and equipment will be necessary for the refrigeration system;

- Ammonia Compressor 4 units

Type: Two-stage compound screw type
Capacity: Approx. 100,000 Kcal/hr x 100 KW each
(at -40°C evaporating temperature and 40°C condensing temperature)
Accessories: Cage rotor type induction motors, reactor type starters, soil separators, oil coolers, oil filters, oil pumps, common bend, pressure gauges (high, middle, low oil), pressure switches (high-cut, oil protection), discharge line stop valves, suction line stop valves, suction filters, air purger valves, drain valves, and others

- Ammonia Compressor 1 unit

Type: High speed multi-cylinder two-staged compound type
Capacity: Approx. 25,000 Kcal/hr x 45 KW
(at -45°C evaporating temp., and 40°C condensing temp.)
Accessories: Cage rotor type induction motor, star-delta type starter, oil separators, oil coolers, oil filters, common bed, pressure gauges (high, middle, low, oil), pressure switches (high-cut, oil protection), discharge line stop valves, suction line stop valves, suction filters, air purge valves, drain valves, and others

- Ammonia Condenser 3 units

Type: Evaporative type
Capacity: Approx. 40 refrigerating tons each
Accessories: Multi-vane type fan, circulating water pump, mounting support, gas inlet valves, liquid outlet valves, equalizing valves, safety valves, drain valves, and others

- Ammonia Receiver 4 units

Type: Horizontal cylindrical type
Capacity: Approx. 850 lit
Accessories: Liquid inlet valves, liquid outlet valves, equalizing valves, equalizing valves for liquid, safety valves, level gauges, drain valves, mounting support and others.

- Air Cooler 9 units

Type: Plate fin type with hot water defrosting device

Cooling surface:
Approx. 600 sq.m x 3 units
Approx. 450 sq.m x 2 units
Approx. 50 sq.m x 2 units
Approx. 270 sq.m x 1 unit
Approx. 150 sq.m x 1 unit

Accessories: Expansion valves, solenoid valves, defrosting device, fan and others

- Ammonia Accumulator 2 units

Type: Vertical cylindrical type

Accessories: Check valves, various top valves, and others

- Ammonia Liquid Return System 1 unit

Accessories: Three-way solenoid valves, check valves, various stop valves and others

- Inert Gas Purger 1 unit

Accessories: Expansion valves, various stop valves, pressure gauges, level gauges and others

- Various Ammonia Piping for Refrigeration Machines and Equipment 1 complete set

- Defrosting Water Pump 2 units
Type: Volute type
Capacity: Approx. 15 cu.m/hr x 15 m (head) x 2.2 KW (motor)
Accessories: Motor, delivery valves, foot valves, pressure gauges and others

- Box Pallet 3,800 pieces

- Forklift 10 units
Type: Battery-driven reach type
Capacity: 1.5 ton x 6 m lift

b) Water Supply, Drainage and Sanitation Systems

The following equipment will be required for these systems. The municipal water supply system and drainage system shall be available at the proposed site.

- Water Receiving Tank 1 unit

A water receiving tank of reinforced concrete with a capacity of about 40 cu.m shall be installed underground just outside of the machine room, and the tank shall be equipped with an evaporative condenser and various pumps.

- Defrosting Water Tank 1 unit

A defrosting water tank of reinforced concrete with a capacity of about 10 cu.m shall be installed underground inside of the building, and shall be equipped with defrosting pumps.

- Water Supply Pump 2 units

Water supply pumps shall be installed for water supply to each section in the facilities and meat processing room.

Type: Volute type with pressure tank system

Capacity: Approx. 7 cu.m/hr x 14 m (head)
x 0.75 KW (motor)

- Various Piping for Water Supply in the Building 1 complete set

- Various Piping for Water Supply outside the Building 1 complete set

- Hydrant with Pump 1 unit

Type: Turbine type

Capacity: Approx. 15 cu.m/hr x 40 m (head)
x 3.7 KW (motor)

- Drainage, Drain Pipe, and Others 1 complete set

- Septic Tank and Treatment Device for Lavatory 1 complete set

- Air Conditioner for Each Meat Processing Facility and Office 2 complete sets

c) Electric Equipment

- Main Switch Boards 1 unit

- Central Control Panel 1 unit

- Stand-by Diesel Generator with the Complete Set of Common Bend and Accessories 3 units

Capacity: Approx. 250 KVA x 2 units
 Approx. 100 KVA x 1 units

- Generator Control Panel 1 unit
- Lightings 1 complete set

The fittings should be of water-proof type with incandescent bulbs for the cold rooms.

- Electric Wiring and Accessories 1 complete set

6) Meat Processing Plants

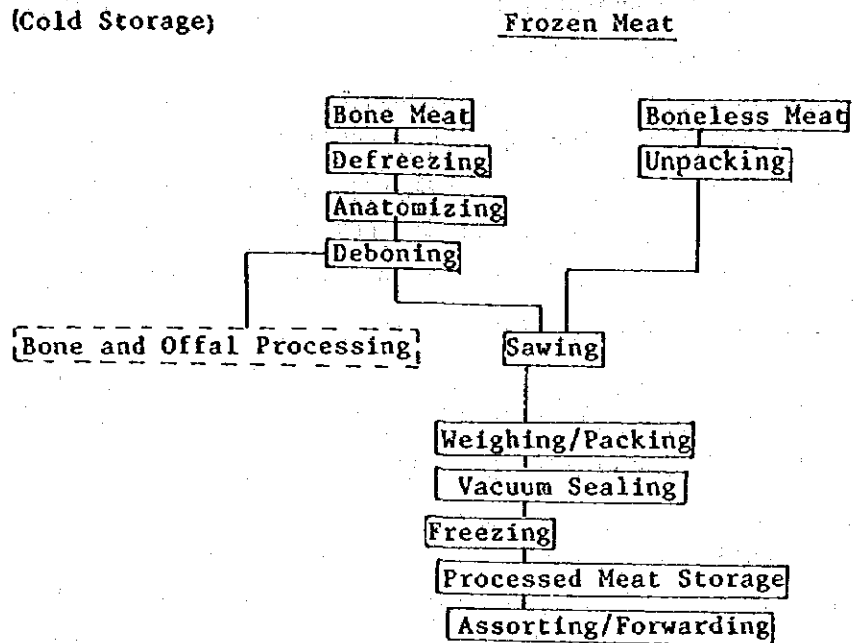
a) Major Dimensions

Two proposed cold storages at large consumption areas, one in Alexandria and one in the Greater Cairo, will be provided with meat processing plants with a capacity of 25 tons per day. They will have the functions of deboning, sawing, weighing, and packing. The proposed cold chain will, therefore, have a meat processing capacity of 50 tons per day in total. In planning the meat processing plants, due attention was paid to the following;

- (1) The design criteria to be adopted shall be prepared to secure a high efficiency in meat processing as well as a high quality of processed meat. For this purpose, the flow of meat in the processing plants shall be rationalized by mechanization. The mechanized handling of meat will largely contribute to saving labor and improving the hygienic conditions of meat processing plants.

- (2) The present packing and sealing systems of processed meat should be maintained in future as well. Fully automatic machines for weighing, price-indicating, carton and packing will not be usable in the Project.
- (3) It is recommended that the processing room temperature shall be maintained in a range of 15°C to 18°C during the works. Furthermore, it will be necessary to partition structurally the processing room from the other parts of the cold storage so that no other employees than those assigned to meat processing can enter the processing room.
- (4) Frozen meat is inevitably defrozen for deboning. The processed meat shall be frozen again after deboning in order to maintain its quality high. Taking the above fact into account, the following system of meat processing is proposed;

Flow in Meat Processing



- (5) The doorway to the meat processing room shall be provided with a shoes cleaner and an air-cleaning equipment for hygienic environment for meat processing.
- (6) The proposed job-wise working standards are shown as follows;

Deboning: 450 kg (1.5 head) per 8 hours per worker

Band Sawings: 3,840 blocks per 8 hours per sawing set with two workers

Weighing and Packing:
1,440 bags per 8 hours per worker

- 7) To pack processed meat of 25 tons per day (by one shift), 25,000 bags of one-kilogram content, 12,500 bags of two-kilogram content, or 8,334 bags of three-kilogram content will be necessary every day.
- 8) For mass processing of meat, conveyors or trays (containers) shall be to carry and stock meat. These containers will contribute to saving labor and highly efficient processing, and simplifying the working procedures and creating hygienic working environment.
- 9) Frozen meat shall be defrozen not by the tank or natural method but by the sterilized defreezing method.
- 10) Presently no carton boxes are available in packing processed meat. A number of conveyors or trays will be inevitably utilized, accordingly. Washers and a spacious yard will be necessary to wash and keep them ready for use.
- 11) Processed meat will be packed in vinyl bags, and then, sealed by vacuum packing machines for its quality control.
- 12) Processed meat packed and sealed shall be frozen again at the freezing room, and stocked at a cold room until it is forwarded.
- 13) The rule to wash and clean the working place immediately after processing shall be strictly observed to maintain the hygienic processing environment. A high-pressure washer should be introduced to attain a high working efficiency.

b) Design of Meat Processing Plants

1) Processing Capacity

Meat processing plants with maximum processing capacity of 50 tons (25 tons per shift, inclusive of 10-ton boneless meat) have been designed to handle both deboned meat and frozen meat without defreezing. The design was made to meet the following requirements satisfactorily;

- (i) On the assumption of 16 net working hours by two shift per day (excluding the washing and cleaning time necessary after duties of each shift), the hourly production of processed meat is computed as follows:

Production

(Unit: bags)

	<u>Per Hour</u>	<u>Per Minute</u>	<u>Remarks</u>
3-kg bag	1,042	18	Average per shift
2-kg bag	1,563	27	
1-kg bag	3,125	52	

- (ii) Assuming that a loss in deboning is 15 percent of the bone meat to be processed (equivalent to the weight of bones), meat obtainable from a head is determined at 300 kg approximately in the study.
- (iii) No molding of each part of meat is taken into account, and small pieces of meat that appear in deboning will be used for balancing the weight of packs or for the others.

(2) Packing and Marketing

In ARE frozen block meat in heat-sealed vinyl bags of one-, two- and three-kilogram contents is on the market. These bagged meat blocks are hauled to retailers, and then to consumers. Since carton boxes are not available in packing and marketing, a fully automatic marketing system cannot be employed. No more effective hauling methods of meat in processing and for marketing are considered except the mechanized collective handling with trays and containers. It is but that carton boxes will be utilized in packing and marketing in the near future.

(3) Consideration on Food Hygiene

In designing meat processing plants, the emphasis was put on the creation of microbe-free working environment which should be separated from the other parts of the plant as well as on the hygienic equipment. The layout of facilities shall be made for effective cleaning of trays and containers shuttling into and out of the plant by tray washers so that only cleaned trays and containers will be used in the plant for hauling meat. No one but those assigned exclusively to the processing section shall enter the processing places without authorization. In principle, meat shall be hauled out of the processing section by the conveyor systems.

(4) The number of equipment and devices necessary to process 25 tons per shift per day of meat was estimated as shown below:

	<u>Unit</u>	<u>3-kg Content</u>	<u>2-kg Content</u>	<u>1-kg Content</u>
Production/day (8 hours)	bag	8,334	12,500	25,000
Defreezing equipment (10 tons/day)	unit	8	8	8
Band saw (Standard capacity: 3,840 bags/unit)	unit	2.2	3.3	6.5
Vacuum packing machine (Standard capacity: 3,840 bags/unit)	unit	2.2	3.3	6.5
Shrinker (Standard capacity: 3,840 bags/unit)	unit	2.2	3.3	6.5

Note: Average figures

Since the above-mentioned estimate was made based on 2.0 kg package, the two-shift working system or over-time work shall be introduced if deboned and processed meat of 10 tons per day is all packed in 1-kg bags.

The plastic containers currently used have the outer measurements of 545 mm long x 435 mm wide x 315 mm high, and can contain about 20 kg of meat block. If the plastic containers are piled up in five layers (with a total height of 157.5 cm) about 360 kg of block meat in 60 containers in total can be stored in an area of 1.0 sq.m. To store 25 tons per day of block meat in this way, about 66 square meters are necessary, and also another area of 66 square meters shall be secured in the processing plant for placing the containers.

(5) Typical Layout of Equipment and Facilities

The following table summarizes the necessary equipment and facilities and their capacity, units and specifications (standard) based on the above-mentioned design concept and estimation. The relevant layout is illustrated below;

LIST OF MEAT PROCESSING EQUIPMENT AND FACILITIES

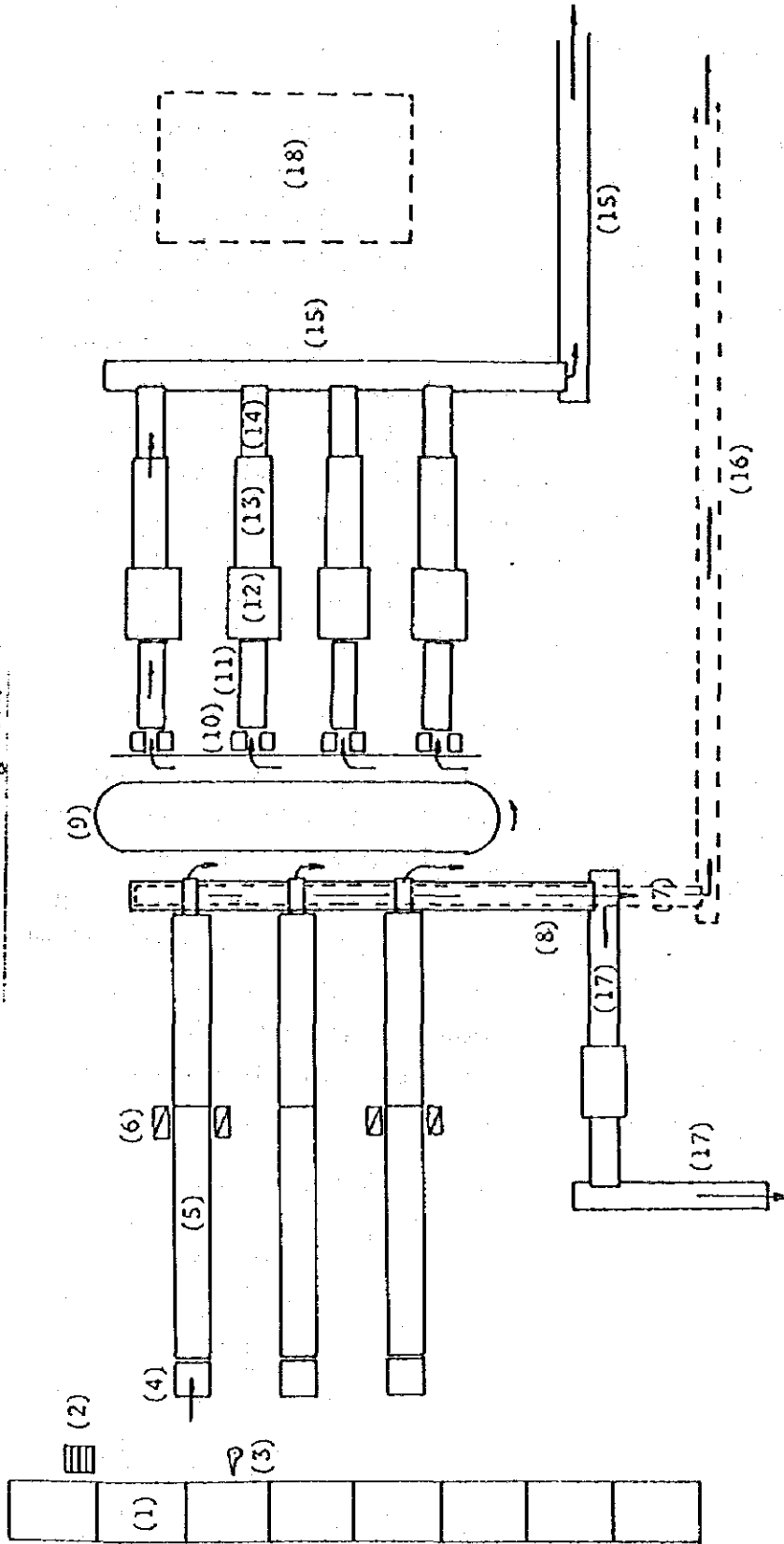
<u>Equipment and Facilities</u>	<u>Capacity</u>	<u>Specifications</u>	<u>Necessary Unit</u>	<u>Remarks</u>
(1) Thawing Machine	-20°C -5°C +1°C 1,200 kg/20 hrs	1,800 mm wide c 2,450 mm long x 2,300 mm high Motor: 10 KW Cooling water: 30 lit/hr	8	For 10 tons of frozen meat
(2) Runner Carts		6 units per thawing machine	48	
(3) Scribe Saw	11 head/hr	Hand saw type Compressor: 30 lit/min 7 to 8 kg/sq.cm	3	For Sawing bone meat
(4) Receiving Table		900 mm wide x 1,800 mm long x 800 mm high SUS	3	
(5) Cut Meat Conveyor	1 to 4 m/min	800 mm wide x 13,500 mm long x 800 mm high, 200 V 0.4 KW SUS-304 Net conveyor	3	With three nets in vertical Section. The upper one is for bones, and the lower one for meat pieces.
(6) Band Saw	8 blocks/min	457 wide x 889 mm long x 1,770 mm high 200V : 1.5 KW	4	
(7) Bone Conveyor	8 to 15 m/min	600 mm wide x 15,000 mm long x 600 mm high 200 V : 0.4 KW SUS-304, net conveyor	1 set	

<u>Equipment and Facilities</u>	<u>Capacity</u>	<u>Specifications</u>	<u>Necessary Unit</u>	<u>Remarks</u>
(8) Scrap Meat Conveyor	8 to 15 m/min	600 mm wide x 15,000 mm long x 1,200 mm high 200 V : 0.75 KW SUS-304	1 set	
(9) Turn Conveyor	8 to 15 m/min	600 mm wide x 26,000 mm long x 650 mm high 200 V: 1.5 KW SUS-304	1 set	
(10) Back Loading Table		800 mm wide x 1,000 mm long x 650 mm high SUS-304	8	
(11) Belt Conveyor	8 to 15 m/min	600 mm wide x 2,500 m long x 800 mm high 200 V : 0.6 KW	4	
(12) Vacuum Packer	8 bags/min (480 bags/hr)	1,750 mm wide x 1,900 mm long x 1,000 mm high Vacuum pump: 3,700 lit x 2 units (6.5 KW/unit)	4	
(13) Shrinker	8 bags/min (480 bags/hr)	1,160 mm wide x 3,200 mm long x 1,450 mm high Vapor: 350 kg/hr. 5 kg/sq.m Water: 45 lit/min Motor: 1.5 KW Air compressor: 11 KW Vapor duct (within 10 m)	4	
(14) Free Role Conveyor		500 mm wide x 2,000 mm long x 800 mm high	4	

<u>Equipment and Facilities</u>	<u>Capacity</u>	<u>Specifications</u>	<u>Necessary Unit</u>	<u>Remarks</u>
(15) Products Conveyor	4 to 8 m/min	600 mm wide x 15,000 mm long x 600 mm high	1 set	For packing on the conveyor
(16) Bone Conveyor	8 to 15 m/min	600 mm wide x 20,000 mm long x 600 mm high	1 set	
(17) Scrap Meat Conveyor	8 to 15 m/min	600 mm wide x 25,000 mm long x 800 mm high	1 set	
<u>INCIDENTAL EQUIPMENT AND FACILITIES</u>				
(1) Case Washer	400 cases/hr	810 mm wide x 2,700 mm long x 1,360 mm high Pressure: 50 kg/sq.cm 3 cu.m/hr	1	
(2) Jet Washer for Cleaning		Pressure: 50 kg/sq.cm Water: 3 cumm/hr 2.2 KW Tank 1 cu.m	2	
(3) Air Compressor		Srew Type 200 V: 11 KW 1.4 cu.m/min 8 kg/sq.cm	2	
(4) Small Boiler	500 kg/hr 5 kg/sq.cm		1	
(5) Major Fixtures and Utensil	- Nife - Container - Closet		24 1,250 c/s 1	

(Note) i. Electric power required: 270.0 KW (257.25 XW)
 ii. Water Requirement: 7,000 lit/hr
 iii. The length of Conveyors (15), (16), and (17) differs by the floor size and type of the building.

Meat Processing Plan



- | | | |
|-----------------------|--|-----------------------------------|
| (1) Thawing Machine | (7) Bone Transportation Conveyor | (13) Shrinker |
| (2) Runner Carts | (8) Scraper-meat Transportation Conveyor | (14) Free-role Conveyor |
| (3) Scribe Saw | (9) Turn Conveyor | (15) Products Conveyor |
| (4) Receiving Table | (10) Back Loading Table | (16) Bone Transportation Conveyor |
| (5) Cut-meat Conveyor | (11) Belt Conveyor | (17) Scrap-meat Conveyor |
| (6) Band Saw | (12) Vacuum Packer | (18) Container and Tray Yard |

(6) Staffing Plan

Taking into consideration the proposed meat processing equipment and facilities, the typical layout, and the flow of foods in the plant, a staffing plan to meet the project requirements was formulated as tabulated below. As is seen in the table, total 74 laborers will be necessary at maximum. The work volume and actual work varies from day to day. The above-mentioned number of laborers was computed on the assumption that the deboning of 10 tons meat, processing of 15 tons boneless meat, and packing in bags of one-kilogram content would be made in one-shift. Provided that boneless meat is packed bags of three-kilogram content, these works can be made by about 34 laborers, less than a half of the number mentioned above.

Specially, deboning is, in principle done, manually. A long-term meat processing plan shall be established by paying attention to the combination of deboning and processing of boneless meat. A year-round processing schedule should be carefully formulated to meet the daily demand of meat for which it is important to secure a necessary quantity of bone meat throughout the year. Otherwise, a great loss and confusion in terms of labor management will take place.

STAFFING PLAN FOR MEAT PROCESSING FACILITIES

	<u>Max. Daily Work Volume (8 Hours)</u>	<u>Hourly Work Volume per Labor</u>	<u>Details of Works</u>	<u>Max. Number of Laborers Required</u>	<u>Remarks</u>
i) Hauling of Frozen meat from defreezing room	10 tons/day (34 head) 1.25 tons/hr	5 tons/day	To haul and saw defrozen meat (from -20°C to + 2°C)	2 persons	Male
ii) Deboning	10 tons/day 1.25 tons/hr	450 kg/day	1) To saw one head into 8 to 10 meat blocks 2) To debone manually block meat with knife	1) 2 2) 22	Male Male or female * (-25)
iii) Band-sawing of meat blocks	25 tons/day 3.125 tons/hr	1 kg-bag: 26 2 kg-bag: 13 3 kg-bag: 9	Two persons per band-saw	8	Male * (-4)
iv) Weighing and packing	<u>bags/day</u> 1 kg-bag: 25,000 2 kg-bag: 12,500 3 kg-bag: 8,334	1,440 bags/day 3 bags/min	To pack saved meat in bags, and adjust the weight of meat in bags by weighing	18	Female * (-8)
v) Vacuum packing and shrinking	<u>Bags/day</u> 1 kg-bag: 25,000 2 kg-bag: 12,500 3 kg-bag: 8,334	480 bags/hr/unit 1,920 bags/hr/4units	To seal the weighed and bagged meat, and after shrinking, wipe vinyl bag	12	Male 4 Female * (-3)
vi) Putting meat bags on containers	Max. (1 kg) 1,250 Min. (3 kg) 1,190	For 2 cases/min	To put in container the sealed meat carried by the conveyor for products containers	3	Female inclusive of one laborer in charge of hauling

	<u>Max. Daily Work Volume (8 Hours)</u>	<u>Hourly Work Volume per Labor</u>	<u>Details of Works</u>	<u>Max. Number of Laborers Required</u>	<u>Remarks</u>
vii) Meat pieces treatment			To weigh and store in containers for meat pieces	3	Female
viii) Bone meat treatment	150 kg/day		To weigh and haul to designated spots	1	Male
ix) Washing containers	1,250/day	400/day	To wash all containers in 3.5 hours after every shift of processing. During the leisure time to carry containers	1	Male
v) Superintendent				1	Male

Note: 1. 74 laborers are necessary to debone 10 kg meat and process 15 tons boneless frozen meat (totally 25 tons per shift) on the assumption of packing in 1 kg-content bags.

2. The laborers consist of 42 males and 32 females.

3. If boneless meat is packed in 3 kg-content bags, all the works in processing 25 tons of meat can be consumed by about 34 laborers.

4. * The figures in parentheses can be reduced if 3 kg-content bags are used to pack boneless meat.

B-25. Abbas Cold Storage at Port Said

1) Outline of Facilities and Capacities

a) Cold Storage Capacity

500 tons per room x 4 rooms = 2,000 tons

b) Room Temperature

Cold rooms: -25°C to 0°C (convertible to either C class
or F class)

Anterooms: $+10^{\circ}\text{C}$

2) Design Concept

a) Schematic Plan

The site of 2,475 sq.m (45 m x 55 m) adjoins New Abbas cold storage which is under construction. For the effective use of land and easy management of facilities, the proposed cold storage facilities were designed to face the existing ones. In this way the truck zone between these two cold storages will be used for the both storages. Since there is no space for the parking area and pallet yard, a land for them should be secured beside the cold storage site. A capacity of this cold storage would be restricted, by the shape and size of the site, at 2,000 tons at maximum.

b) Building Plan

As mentioned above, the width of this site is only 45 m. A sufficient front yard cannot be secured if cold rooms are designed to be in parallel. The center-corridor type will be adopted, accordingly. An open platform is proposed for easy handling of cargoes. The frontage of the cold storage building with a broad view will be allocated for the office and management

zone. The machine room will be placed behind the cold rooms so that the access to the machine room for operation and maintenance is made from the road at wharf side.

3) Refrigeration, Water Supply, Sewerage, and Electricity Supply

a) Refrigeration system

The following machines are required for the refrigeration system:

- Ammonia compressor 3 units
 - Type: Two staged compound screw type
 - Capacity: Approx. 75,000 Kcal/hr x 75 KW each
(-40°C for Evaporating temp., and
40°C for Condensing temp.)
 - Accessories: Cage rotor type induction motors,
reactor type starter, oil coolers, oil
filters, oil pumps, common bed,
pressure gauge (high, middle, low,
oil), pressure gauge (high, middle,
low, oil), pressure switches
(high-cut, oil protection), discharge
line stop valves, suction line stop
valves, suction filters, air purge
valves, drain valves, and others

- Ammonia condensers 2 units
 - Type: Evaporation type
 - Capacity: Approx. 30 refrigerating tons each,
 - Accessories: Multi-vane type fan, circulating water
pump, mounting support, various stop
valves and others

- Ammonia receivers 2 units
 - Type: Horizontal cylindrical type
 - Capacity: Approx. 850 lit.
 - Accessories: Level gauges, various valves, mounting support, and others

- Air coolers 6 units
 - Type: Plate fin type with hot water defrosting device
 - Cooling surface: Approx. 350 m² x 4 units
50 m² x 2 units
 - Accessories: Expansion valves, solenoid valves, defrosting devices, fans, and others

- Ammonia accumulator 1 unit
 - Type: Vertical cylindrical type
 - Accessories: Check valves, various stop valves, and others

- Ammonia liquid return system 1 unit
 - Accessories: Three-way solenoid valves, check valves, various stop valves

- Inert gas purger 1 unit
 - Accessories: Expansion valves, various stop valves, pressure gauges, level gauges, and others

- Various piping for ammonia refrigeration machines and equipment 1 complete set

- Defrosting water pump 1 unit
Type: Volute type
Capacity: Approx. 15 m³ x 15 m(head) x 2.2 KW (motor)
Accessories: Motor, delivery valves, foot valves,
pressure gauges, and others
- Box pallet 1,300 pieces
- Forklift 4 units
Type: Battery-driven reach type
Capacity: 1.5 tons x 6 m lift

b) Water Supply and Sewerage System

The following equipment is required for water supply and sewerage systems. The municipal water supply and sewerage must be available in the proposed site:

- Water receiving tank 1 unit

The water receiving tank made of reinforced concrete with capacity of about 10 m³ shall be installed underground outside the machine room under the evaporative condenser and various pumps.

- The defrosting water tank 1 unit

Defrosting water tank made of reinforced concrete with capacity of about 10 m³ shall be installed underground inside building under the defrosting pumps.

- Water supply pump unit 1 unit

A pressure pump unit shall be equipped for water supply to each section in the facility.

Type: Volute type

Capacity: Approx. $7\text{m}^3/\text{hr}$ x 14 m(head) x 0.75 KW (motor)

- Various piping for water supply in the building 1 complete set

- Hydrant with pump 1 unit

Type: Turbine type

Capacity: Approx. $15\text{m}^3/\text{h}$ x 40 m(head) x 3.7 KW (motor)

- Drain pipe and others 1 complete set

- Septic tank and treatment device for lavatory 1 complete set

- Air conditioner for office 1 complete set

c) Electric equipment

- Main switch board 1 unit

- Central control panel 1 unit

- Diesel generator for emergency use with the complete set of common bed and accessories 2 units

Capacity: Approx. 200 KVA x 1 unit

50 KVA x 1 unit

- Generator control panel 1 unit

- Lightings 1 complete set

The fittings should be of water-proof type with incandescent bulbs for the cold rooms

- Electric wiring and accessories 1 complete set

B-26. Sherif Cold Storage at Port Said

1) Outline of Facilities and Capacities

a) Cold Storage Capacity

750 tons per room x 4 rooms = 3,000 tons

b) Room Temperature

Cold rooms: -25°C to 0°C (Convertible to either F class
or C class)

Anteroom: +10°C

2) Design Concept

a) Schematic Plan

The Sherif site is slightly larger than the Abbas site. However, only the northern side of this site faces a road. The size and shape of the site would limit the cold storage capacity to 3,000 tons at maximum. For effective operation of this cold storage, the following requirements should be satisfied;

- ° To utilize the land between the site and road as truck berth;
- ° To construct a service road across the railway for operation and maintenance of the machines which will be installed behind the cold rooms.
- ° To secure a land for the parking area and pallet yard beside the side

b) Building Plan

The center corridor type is proposed in consideration of the limited width of the site.

3) Refrigeration, Water Supply, Sewerage, and Electricity Supply

a) Refrigeration System

The following machines are required as the refrigeration system:

- Ammonia compressor 3 units

Type: Two-staged compound screw type
Capacity: Approx. 90,000 Kcal/hr x 100 KW each
(-40°C for Evaporating temp., and 40°C for Condensing temp.)
Accessories: Cage rotor type induction motors, reactor type starter, oil separators, oil coolers, oil filters, oil pumps, common bed, pressure gauge (high, middle, low, oil), pressure switches (high-cut, oil protection), discharge line stop valves, suction line stop valves, suction filters, air purge valves, drain valves, and others

- Ammonia condensers 2 units

Type: Evaporation type
Capacity: Approx. 40 refrigerating tons each
Accessories: Multi-vane type fan, circulating water pump, mounting support, various stop valves and others

- Ammonia receivers 2 units
 - Type: Horizontal cylinder type
 - Capacity: Approx. 850 lit.
 - Accessories: Level gauges, various valves, mounting support, and others.

- Air coolers 6 units
 - Type: Plate fin type with hot water defrosting device
 - Cooling surface: Approx. 370m^2 x 4 units
 50m^2 x 1 unit
 - Accessories: Expansion valves, solenoid valves, defrosting devices, fans, and others.

- Ammonia accumulator 1 unit
 - Type: Vertical cylinder type
 - Accessories: Check valves, various stop valves, and others.

- Ammonia liquid return system 1 unit
 - Accessories: Expansion valves, various stop valves, pressure gauges, level gauges, and others.

- Inert gas purger 1 unit
 - Accessories: Expansion valves, various stop valves, pressure gauges, level gauges, and others

- Various piping for ammonia refrigeration machines and equipment 1 complete set
- Defrosting water pump 2 units
 - Type: Volute type
 - Capacity: Approx. 15 m³ x 15 m(head) x 2.2KW (motor)
 - Accessories: Motor, delivery valves, foot valves, pressure gauges, and others.
- Box pallet 1,900 pieces
- Forklift 6 units
 - Type: Battery-driven reach type
 - Capacity: 1.5 tons x 6 m lift

b) Water Supply and Sewerage System

The following equipment is required for water supply and sewerage systems. The municipal water supply and sewerage must be available in the proposed site:

- Water receiving tank 1 unit

Water receiving tank made of reinforced concrete with capacity of about 10 m³ shall be installed underground outside the machine room, under the evaporative condenser and various pumps.

- Defrosting water tank 1 unit

Defrosting water tank made of reinforced concrete with capacity of about 10 m³ shall be installed underground inside building, under defrosting pumps.

- Supplying water pump unit 1 unit

Pressure pump unit shall be equipped for water supply to each section in the facility.

Type: Volute type
Capacity: Approx. $7 \text{ m}^3/\text{h}$ x 14 m (head) x
0.75 KW (motor)

- Various piping for water supply in the building 1 complete set

- Hydrant with pump 1 unit

Type: Turbine type
Capacity: Approx. $15 \text{ m}^3/\text{h}$ x 40 m (head) x
3.75 KW (motor)

- Drainage, drain pipe, and others 1 complete set

- Septic tank and treatment device for lavatory 1 complete set

- Air conditioner for office 1 complete set

c) Electric Equipment

- Main switch board 1 unit

- Central control panel 1 unit

- Diesel generator for emergency use with the complete set of common bed and accessories 2 units

Capacity: Approx. 250 KVA x 1 unit
50 KVA x 1 unit

- Generator control panel 1 unit
- Lightings 1 complete set

The fitting should be of water-proof type
with incandescent bulbs for the cold rooms

- Electric wiring and accessories 1 complete set

B-27. Suez Cold Storage at Suez

1) Location

The proposed site is located between Attaqa No.2 and Attaqa No.3 cold storages owned by GERCO, and is 10,000 sq.m in size (100 m x 100 m).

2) Outline of Facilities and Capacities

a) Cold Storage Capacity

750 tons per room x 4 rooms = 3,000 tons

b) Room Temperature

Cold rooms:	-25°C to 0°C (Convertible to either F class or C class)
Cargo handling area:	+ 10°C
Anteroom:	+ 10°C

3) Design Concept

a) Schematic Plan

The Suez cold storage will function to stock temporarily imported cold foods and forward them to Cairo like the cold storage at Port Said, and many heavy trucks will arrive and depart at the cold storage. In schematic designing, it is, therefore, most important to secure the smooth flow of these trucks in the cold storage compound. The parking space for the trucks will be provided so that the truck berth adjoins a platform.

b) Building Plan

The building plan was formulated to satisfy the following requirements:

- To meet the local natural conditions, specially the meteorological conditions;
- To provide a clear operations flow of cold foods operations;
- To simplify and make the building compact;
 - ° Simple flow pattern
 - ° Easy access
- To provide independent entrances at working zones;
- To reduce energy consumption; and,
- To secure easy operation and maintenance.

4) Architectural Design

a) Zone Plan

The proposed facilities are roughly divided into four zones; the handling zone (platform), cold room zone, office zone, and machine room zone.

° Office zone

The office zone will be placed on the opposite side of the road to give a good view of the truck berth to it.

- ° Cold room zone
The cold rooms will be arranged in parallel in consideration of the easy handling of a large amount of cold foods in a short time.
- ° Cargo handling
The handling zone (platform) will be of an enclosed type so that the room temperature can be maintained at an optimum level in handling a great deal of cold foods. An anteroom will be attached to the handling area to prevent cold foods from deterioration.
- ° Machines
The machine room will be provided adjacent to the office zone and the cold room zone.

b) Cross-sectional Plan

Clearance between ceiling and floor will be eight meters in the cold rooms, and 2.8 meters in the office rooms.

5) Refrigeration, Water Supply, Sewerage, and Electricity Supply

a) Refrigeration System

The following machines are required for the refrigeration system:

- Ammonia compressor 3 units
Type: Two-staged compound screw type
Capacity: Approx. 100,000 Kcal/hr x 100 KW each
(-40°C for Evaporating temp., and
+40°C for Condensing temp.)

Accessories: Cage rotor type induction motors, reactor type starter, oil separators, oil coolers, oil filters, oil pumps, common bed, pressure gauge (high, middle, low, oil), pressure switches (high-cut, oil protection), discharge line stop valves, suction line stop valves, suction filters, air purge valves, drain valves, and others.

- Ammonia condensers 2 units

Type: Evaporation type
Capacity: Approx. 40 refrigerating tons each
Accessories: Multi-vane type fan, circulating water pump, mounting support, various stop valves and others.

- Ammonia receivers 2 units

Type: Horizontal cylinder type
Capacity: Approx. 850 lit.
Accessories: Level gauges, various valves, mounting support, and others.

- Air coolers 5 units

Type: Plate fin type with hot water defrosting device
Cooling surface: Approx. 370 m^2 x 4 units
 250 m^2 x 1 unit
Accessories: Expansion valves, solenoid valves, defrosting devices, fans, and others.

- Ammonia accumulator 1 unit

Type: Vertical cylinder type
Accessories: Check valves, various stop valves, and others.

- Ammonia liquid return system 1 unit

Accessories: Three-way solenoid valves, check valves, various stop valves.

- Inert gas purger 1 unit
Accessories: Expansion valves, various stop valves, pressure gauges, level gauges and others.

- Various piping for ammonia refrigeration machines and equipment 1 complete set

- Defrosting water pump 1 unit

Type: Volute type
Capacity: Approx. $15 \text{ m}^3/\text{hr}$ x 15 m(head) x 2.2 KW (motor)
Accessories: Motor, delivery valves, foot valves, pressure gauges, and others.

- Box pallet 1,900 pieces

- Forklift 7 units

Type: Battery-driven reach type
Capacity: 1.5 tons x 6 m lift

b) Water Supply and Sewerage System

The following equipment is required for water supply and sewerage systems. The municipal water supply and sewerage must be available in the proposed site:

- Water receiving tank 1 unit

Water receiving tank made of reinforced concrete with capacity of about 10 m^3 shall be installed underground outside the machine room under the evaporation condenser and various pumps.

- Defrosting water tank 1 unit

Defrosting water tank made of reinforced concrete with capacity of about 10 m^3 shall be installed underground inside the building, under the defrosting pumps.

- Water supply pump unit 1 unit

A pressure pump unit shall be equipped for water supply to each section in the plant.

Type: Volute type
Capacity: Approx. $7 \text{ m}^3/\text{h}$ x 14 m (head) x
0.75 KW (motor)

- Various piping for water supply in the building 1 complete set

- Hydrant with pump 1 unit

- Type: Turbine type
- Capacity: Approx. 15 m³/h x 40 m (head) x
3.7 KW (motor)

- Drain pipe and others 1 complete set

- Septic tank and treatment device for
lavatory 1 complete set

- Air conditioner for office room 1 complete set

c) Electric Equipment

- Main switch board 1 unit

- Central control panel 1 unit

- Diesel generator for emergency use with
the complete set of common bed and
accessories 2 units

- Capacity: Approx. 275 KVA x 1 unit
50 KVA x 1 unit

- Generator control panel 1 unit

- Lightings 1 complete set

The fittings should be of water-proof
type with incandescent bulbs for the
cold rooms

- Electric wiring and accessories 1 complete set

B-28. Ghamra Cold Storage at Cairo

1) Outline of Facilities and Capacities

a) Cold Storage Capacity

750 tons per room x 4 rooms = 3,000 tons

b) Room Temperature

Cold rooms: -25°C to 0°C (Convertible to either C class
or F class)

2) Design Concept

a) Schematic Plan

The proposed site adjoins the existing cold storage of GERCO. The proposed cold storage is so designed to face the existing one so that the truck zone between them will be utilized for the both cold storages. This design is advantageous both in the land use and storage management. The land area as large as possible should be secured between the two storages for providing a parking area in the center of the area. The land behind the proposed cold storage will be used as the pallet yard.

b) Building Plan

Since the proposed site is too small to build both a meat processing plant and a cold storage, only a cold storage is contemplated with a capacity of 3,000 tons. In planning this cold storage, the center-corridor type will be adopted to have the largest platform area available for smooth cargo handling for the best use of this cold storage to meet the daily demand

of cold foods in Cairo. Presently, the transformer for the existing GERCO cold storage is placed in the proposed site. It is, therefore, necessary to relocate it to the westernmost of the land between the two cold storages prior to constructing the proposed cold storage.

3) Refrigeration, Water Supply, Sewerage, and Electric Supply

a) Refrigeration System

The following machines are required for the refrigeration system:

- Ammonia compressors 3 units
 - Type: Two-staged compound screw type
 - Capacity: Approx. 100,000 Kcal/hr x 100 KW each (-40°C for Evaporating temp., and +40°C Condensing temp.)
 - Accessories: Cage rotor type induction motors, reactor type starter, oil separators, oil coolers, oil filters, oil pumps, common bed, pressure gauge (high, middle, low, oil), pressure switches (high-cut, oil protection), discharge line stop valves, suction line stop valves, suction filters, air purge valves, drain valves, and others

- Ammonia condensers 2 units
 - Type: Evaporation type
 - Capacity: Approx. 40 refrigerating tons each
 - Accessories: Multi-vane type fan, circulating water pump, mounting support, various stop valves and others

- Ammonia receivers 2 units
 - Type: Horizontal cylinder type
 - Capacity: Approx. 850 lit.
 - Accessories: Level gauges, various valves, mounting support, and others

- Air coolers 6 units
 - Type: Plate fin type with hot water defrosting devices
 - Cooling surface: Approx. 370 m^2 x 4 units
 50 m^2 x 2 units
 - Accessories: Expansion valves, solenoid valves, defrosting devices, fans, and others

- Ammonia accumulator 1 unit
 - Type: Vertical cylinder type
 - Accessories: Check valves, various stop valves, and others

- Ammonia liquid return system 1 unit
 - Accessories: Three-way solenoid valves, check valves, various stop valves

- Inert gas purger 1 unit
 - Accessories: Expansion valves, various stop valves, pressure gauges, level gauges, and others

- Various piping for ammonia refrigeration machines and equipment 1 complete set

- Defrosting water pump 1 unit
- Type: Volute type
- Capacity: Approx. $15 \text{ m}^3/\text{h}$ x 15 m(head) x 2.2 KW
(motor)
- Accessories: Motor, delivery valves, foot valves,
pressure gauges, and others.
- Box pallet 1,900 pieces
- Forklift 5 units
- Type: Battery-driven reach type
- Capacity: 1.5 tons x 6 m lift

b) Water Supply and Sewerage System

The following equipment is required for water supply and sewerage systems. The municipal water supply and sewerage must be available in the proposed site:

- Water receiving tank 1 unit

Water receiving tank made of reinforced concrete with capacity of about 10 m^3 shall be installed underground outside the machine room under the evaporation condenser and various pumps.

- Defrosting water tank 1 unit

Defrosting water tank made of reinforced concrete with capacity of about 10 m^3 shall be installed underground inside the building under the defrosting pumps.

- Water supply pump unit 1 unit

Pressure pump unit shall be equipped for water supply to each section in the plant.

Type: Volute type
Capacity: Approx. 7 m³/h x 14 m(head) x 0.75 KW
(motor)

- Various piping for water supply in the building 1 complete set

- Hydrant with pump 1 unit

Type: Turbine type
Capacity: Approx. 15 m³/h x 40 m(head) x 3.7 KW
(motor)

- Drain pipe and others 1 complete set

- Septic tank and treatment device for lavatory 1 complete set

- Air conditioner for office 1 complete set

c) Electric Equipment

- Main switch board 1 unit

- Central control panel 1 unit

- Diesel generator for emergency use with the complete set of common bed and accessories 2 units

Capacity: Approx. 250 KVA x 1 unit
50 KVA x 1 unit

- Generator control panel 1 unit

- Lightings 1 complete set

The fittings should be of water-proof
type with incandescent bulbs for the
cold rooms

- Electric wiring and accessories 1 complete set

B-29. Ramada Cold Storage at Cairo

1) Location

The existing Ramada cold storage is operated in the suburbs of Cairo along a trunk road which connects Cairo and Alexandria. A site for the proposed cold storage and meat processing plant will be located near the existing one. The necessary area will be 16,000 square meters (160 m x 100 m) for the cold storage with a capacity of 3,000 tons and meat processing plant.

2) Outline of Facilities and Capacities

a) Cold Storage Capacity

750 tons per room x 4 rooms = 3,000 tons

b) Meat Processing Capacity

° Daily capacity by one shift

Bone meat	5 tons per day
Boneless meat	20 "
<u>Total</u>	<u>25 tons per day</u>

° Maximum daily capacity by three shifts

75 tons per day

° Products storage capacity

35 tons equivalent to meat
processed by two-days works on an
average

c) Room Temperature

Cold rooms:	-25°C to 0°C (Convertible to either C class or F class)
Freezing room:	-30°C
Processing room:	+18°C
Processed meat storage room:	-25°C
Anteroom:	+10°C

3) Design Concept

a) Schematic Plan

The proposed Ramada cold storage will store cold foods hauled from cold storages at port area, and forward some of them, after processing, to retailers in the Greater Cairo to meet the daily demand.

- ° The building will be constructed at the heart of this site, and provided with platforms at the both sides. The platforms at the left side will be used for unloading cargoes transported from the ports and for loading unprocessed meat. And the other platform for loading processed meat. Each platform will have its own truck berth and parking area in front of it.
- ° For smooth operation in the compound, the service roads will be constructed around the building.

b) Building Plan

A building plan is formulated to meet the following requirements;

- To meet the local natural conditions inclusive of the meteorological condition;
- To simplify the flow of products and the process of operation;
- To plan and design a simple and compact building in its structure;
 - ° Simple flow pattern
 - ° Easy access
- To provide independent entrances at working zones;
- To reduce energy consumption; and,
- To secure easy operation and maintenance.

4) Architectural Plan

a) Zone Plan

The proposed facilities consist of five zones; the handling zone (platforms), cold room zone, meat processing zone, office zone, and machine room zone.

° Office zone

To command a good view of the truck berth to and have easy access of trucks, the office zone will be placed beside the left platform at the opposite side of the existing road.

° Cold room zone

Four cold rooms with a storage capacity of 740 tons each will be arranged in center corridor type.

◦ Handling zone

Open-type platforms will be constructed for cargo handling by forklift

◦ Meat processing zone

The meat processing zone and the above-mentioned cold room zone will be partitioned with walls.

To maintain hygienic environmental conditions, the meat processing zone will provide an exclusive anteroom for this zone to which the access will be made through the anteroom for cold rooms. Furthermore, laborers in charge of meat processing will be given independent facilities such as locker room and a lavatory for their exclusive use. Meat to be processed will be carried into the processing zone from cold rooms through the anterooms mentioned above. The processed meat will be frozen again, and stored in the cold room for processed meat until its forwarding to the market.

◦ Machine room

The machine room will be constructed behind the cold rooms, adjacent to the office room.

b) Cross-sectional plan

The clearance between ceiling and floors of the cold rooms will be eight meters while that of the freezing the room, and the cold room for products three meters because the manpower handling of products is to be carried out.

5) Refrigeration, Water Supply, Sewerage and Electricity Supply

a) Refrigeration System

The following machines are required as the refrigeration system:

- Ammonia compressor 4 units

Type: Two-staged compound screw type

Capacity: Approx. 100,000 Kcal/hr x 100 KW
x 3 units

Approx. 55,000 Kcal/hr x 75 KW
x 1 unit

(-40°C for Evaporating temp., and
+40°C for Condensing temp.)

Accessories: Cage rotor type induction motors, reactor type starters, oil separators, oil coolers, oil filters, oil pumps, common bed, pressure gauges (high, middle, low, oil), pressure switches (high-cut, oil protection), discharge line stop valves, suction line stop valves, suction filters, air purge valves, drain valves, and others.

- Ammonia condensers 2 units

Type: Evaporation type

Capacity: Approx. 40 refrigerating tons each

- Accessories: Multi-vane type fan, circulating water pump, mounting support, gas inlet valves, liquid outlet valves, equalizing valves, safety valves, drain valves, and others.
- Ammonia receivers 2 units
- Type: Horizontal cylinder type
- Capacity: Approx. 850 lit.
- Accessories: Liquid inlet valves, liquid outlet valves, equalizing valves, equalizing valves for liquid, safety valves, level gauges, drain valves, mounting support, and others.
- Air coolers 8 units
- Type: Plate fin type with hot-water defrosting device
- Cooling surface: Approx. 500 m² x 3 units
Approx. 550 m² x 1 unit
Approx. 50 m² x 1 unit
Approx. 150 m² x 1 unit
- Accessories: Expansion valves, solenoid valves, defrosting devices, fan, and others.
- Ammonia accumulators 2 units
- Type: Vertical cylinder type
- Accessories: Check valves, various stop valves, and others

- Ammonia liquid return system 1 unit
 - Accessories: Three way solenoid valves, check valves, various stop valves and others.
- Inert gas purger 1 unit
 - Accessories: Expansion valves, various stop valves, pressure gauges, level gauges and others.
- Various piping for ammonia refrigeration machines and equipment 1 complete set
- Defrosting water pump 1 unit
 - Type: Volute type
 - Capacity: Approx. $15 \text{ m}^3/\text{hr}$ x 15 m(head)
x 2.2 (motor)
 - Accessories: Motor, delivery valves, float valves, pressure gauges, and others.
- Box pallets 1,900 pieces
- Forklifts 5 units
 - Type: Battery-driven reach type
 - Capacity: 1.5 ton x 6 m lift

b) Water Supply and Sewerage System

The following equipment is required for water supply and sewerage system. The municipal water supply and sewerage must be available in the proposed site.

- Water receiving tank 1 unit

Water receiving tank made of reinforced concrete with capacity of about 30 m^3 shall be installed underground outside the machine room under an evaporation condenser and various pumps.

- Defrosting water tank 1 unit

Defrosting water tank made of reinforced concrete with capacity of about 10 m^3 shall be installed underground inside the building the defrosting pumps.

- Water supplying pump units 2 units

The pressure pump units shall be equipped for water supply to each section in the plant and the meat processing room.

Type: Volute type with pressure tank system
Capacity: Approx. $7 \text{ m}^3/\text{hr}$ x 14 m(head)
x 0.75 KW (motor)

- Various piping for water supply in the building

1 complete set

- Various piping for outdoor water supply

1 complete set

- Hydrant with pump 1 unit

Type: Turbine type
Capacity: Approx. $15 \text{ m}^3/\text{hr}$ x 40 m(head)
x 3.7 KW(motor)

- Drain pipes and others 1 complete set
- Septic tank and treatment device for lavatory 1 complete set
- Air conditioner for each meat processing room and office room 2 complete sets

c) Electric Equipment

- Main switch board: 1 unit
- Central control panel 1 unit
- Diesel generator for emergency use with the complete set of common bed and accessories 3 units
Capacity: Approx. 250 KVA x 2 units
 Approx. 100 KVA x 1 unit
- Generator control panel 1 unit
- Lightings 1 complete set

The fittings should be of water-proof type with incandescent bulbs for the cold rooms. 1 complete set

- Electric wiring and accessories 1 complete set

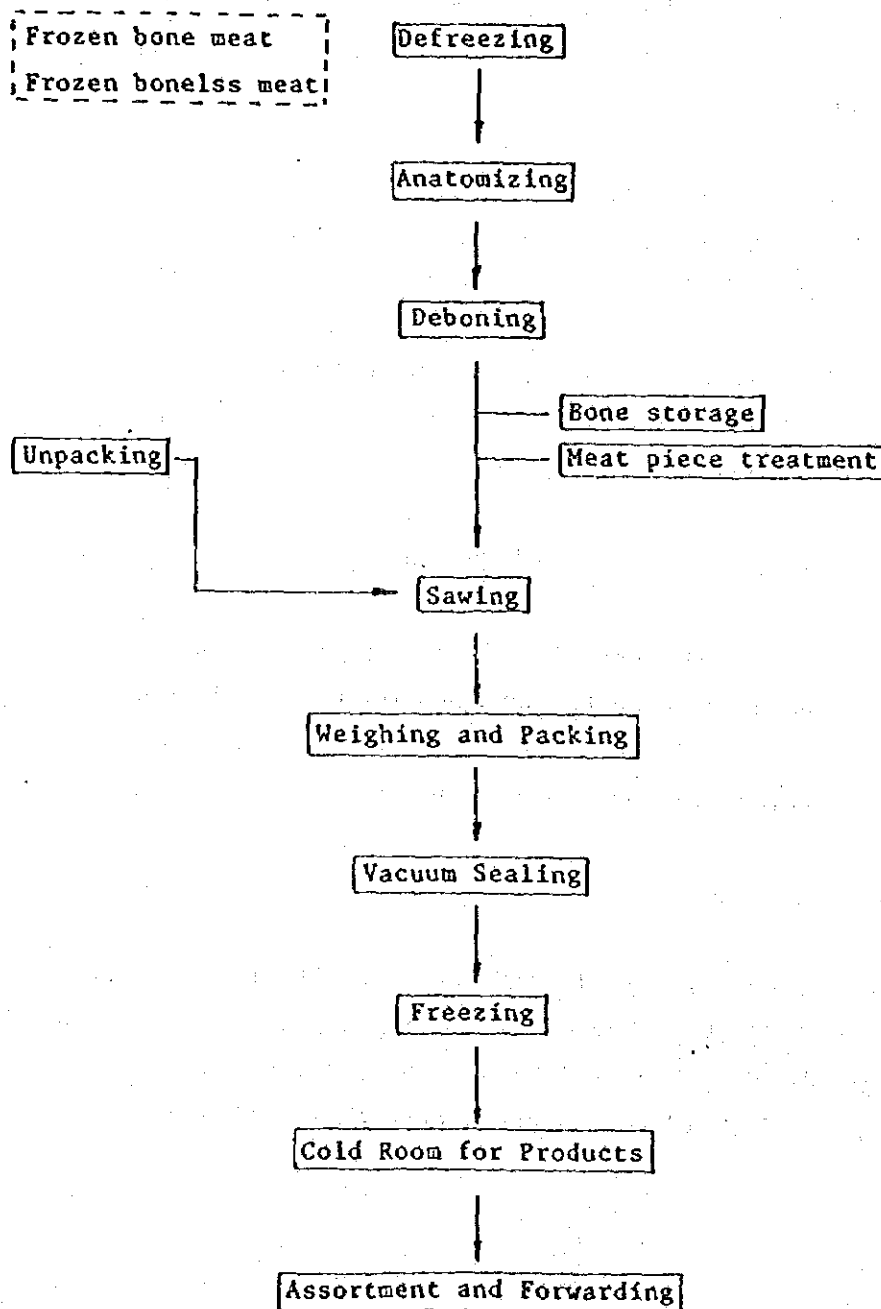
6) Meat Processing Plant

The meat processing plant to be installed in the cold storages in Cairo shall play a role of processing imported cold meat, both block meat in 30-kg bags and bone meat, sent from port-type cold storages, and forward to consumers through retail shops.

The processing works will cover the deboning, sawing, and packing. The processing capacity will be 25 tons per day by one shift. The main features of plant, work flow of processing, and details of design will be similar to those of the cold storage proposed at Alexandria.

Flow of Meat Processing

Cold rooms



LIST OF MEAT PROCESSING EQUIPMENT AND FACILITIES

<u>Equipment and Facilities</u>	<u>Capacity</u>	<u>Specifications</u>	<u>Necessary Unit</u>	<u>Remarks</u>
(1) Thawing Machine	-20°C to +5°C ~ +1°C 1,200 kg/20 hrs	1,800 mm wide x 2,450 mm long x 2,300 mm high Motor: 10 KW Cooling water: 30 lit/hr	8	For 10 tons of frozen meat
(2) Runner Carts		6 units per thawing machine	48	
(3) Scribe Saw	11 head/hr	Hand saw type Compressor: 30 lit/min 7 to 8 kg/sq.cm	3	For Sawing bone meat
(4) Receiving Table		900 mm wide x 1,800 mm long x 800 mm high SUS	3	
(5) Cut Meat Conveyor	1 to 4 m/min	800 mm wide x 13,500 mm long x 800 mm high, 200 V 0.4 KW SUS-304 Net conveyor	3	With three nets in vertical Section. The upper one is for bones, and the lower one for meat pieces.
(6) Band Saw	8 blocks/min	457 wide x 889 mm long x 1,770 mm high 200V : 1.5 KW	4	
(7) Bone Conveyor	8 to 15 m/min	600 mm wide x 15,000 mm long x 600 mm high 200 V : 0.4 KW SUS-304, net conveyor	1 set	
			1 set	

<u>Equipment and Facilities</u>	<u>Capacity</u>	<u>Specifications</u>	<u>Necessary Unit</u>	<u>Remarks</u>
(8) Scrap Meat Conveyor	8 to 15 m/min	600 mm wide x 15,000 mm long x 1,200 mm high 200 V : 0.75 KW SUS-304	1 set	
(9) Turn Conveyor	8 to 15 m/min	600 mm wide x 26,000 mm long x 650 mm high 200 V: 1.5 KW SUS-304	1 set	
(10) Back Loading Table		800 mm wide x 1,000 mm long x 650 mm high SUS-304	8	
(11) Belt Conveyor	8 to 15 m/min	600 mm wide x 2,500 m long x 800 mm high 200 V : 0.6 KW	4	
(12) Vacuum Packer	8 bags/min (480 bags/hr)	1,750 mm wide x 1,900 mm long x 1,000 mm high Vacuum pump: 3,700 lit x 2 units (6.5 KW/unit)	4	
(13) Shrinker	8 bags/min (480 bags/hr)	1,160 mm wide x 3,200 mm long x 1,450 mm high Vapor: 350 kg/hr. 5 kg/sq.m Water: 45 lit/min Motor: 1.5 KW Air compressor: 11 KW Vapor duct (within 10 m)	4	
(14) Free Role Conveyor		600 mm wide x 2,000 mm long x 800 mm high	4	

<u>Equipment and Facilities</u>	<u>Capacity</u>	<u>Specifications</u>	<u>Necessary Unit</u>	<u>Remarks</u>
(15) Products Conveyor	4 to 8 m/min	600 mm wide x 15,000 mm long x 600 mm high	1 set	For packing on the conveyor
(16) Bone Conveyor	8 to 15 m/min	600 mm wide x 20,000 mm long x 600 mm high	1 set	
(17) Scrap Meat Conveyor	8 to 15 m/min	600 mm wide x 25,000 mm long x 800 mm high	1 set	

INCIDENTAL EQUIPMENT AND FACILITIES

(1) Case Washer	400 cases/hr	810 mm wide x 2,700 mm long x 1,360 mm high Pressure: 50 kg/sq.cm 3 cu.m/hr	1	
(2) Jet Washer for Cleaning		Pressure: 50 kg/sq.cm Water: 3 cumm/hr 2.2 KW Tank 1 cu.m	2	
(3) Air Compressor		Srew Type 200 V: 11 KW 1.4 cu.m/min 8 kg/sq.cm	2	
(4) Small Boiler	500 kg/hr 5 kg/sq.cm		1	
(5) Major Fixtures and Utensil	- Nife - Container - Closet		24 1,250 c/s 1	

(Note) i. Electric power required: 270.0 KW (257.25 KW)
 ii. Water Requirement: 7,000 lit/hr
 iii. The length of Conveyors (15), (16), and (17) differs by the floor size and type of the building.

STAFFING PLAN FOR MEAT PROCESSING FACILITIES

<u>Max. Daily Work Volume (8 Hours)</u>	<u>Hourly Work Volume per Labor</u>	<u>Details of Works</u>	<u>Max. Number of Laborers Required</u>	<u>Remarks</u>
i) Hauling of Frozen meat from defreezing room	10 tons/day (34 head) 1.25 tons/hr	5 tons/day	2 persons	Male
ii) Deboning	10 tons/day 1.25 tons/hr	450 kg/day	1) 2 2) 22	1) Male 2) Male or female * (-25)
iii) Band-sawing of meat blocks	25 tons/day 3,125 tons/hr	1 kg-bag: 26 2 kg-bag: 13 3 kg-bag: 9	8	Male * (-4)
iv) Weighing and packing	bags/day 1 kg-bag: 25,000 2 kg-bag: 12,500 3 kg-bag: 8,334	bags/day 1,440 3	18	Female * (-8)
v) Vacuum packing and shrinking	Bags/day 1 kg-bag: 25,000 2 kg-bag: 12,500 3 kg-bag: 8,334	480 bags/hr/unit 1,920 bags/hr/4units	12	Male 4 Female * (-3)
vi) Putting meat bags on containers	Max. (1 kg) 1,250 Min. (3 kg) 1,190	For 2 cases/min	3	Female inclusive of one laborer in charge of hauling containers

	<u>Max. Daily Work Volume (8 Hours)</u>	<u>Hourly Work Volume per Labor</u>	<u>Details of Works</u>	<u>Max. Number of Laborers Required</u>	<u>Remarks</u>
vii) Meat pieces treatment			To weigh and store in containers for meat pieces	3	Female
viii) Bone meat treatment	150 kg/day		To weigh and haul to designated spots	1	Male
ix) Washing containers	1,250/day	400/day	To wash all containers in 3.5 hours after every shift of processing. During the leisure time to carry containers	1	Male
v) Superintendent				1	Male

- Note: 1. 74 laborers are necessary to debone 10 kg meat and process 15 tons boneless frozen meat (totally 25 tons per shift) on the assumption of packing in 1 kg-content bags.
2. The laborers consist of 42 males and 32 females.
3. If boneless meat is packed in 3 kg-content bags, all the works in processing 25 tons of meat can be consumed by about 34 laborers.
4. * The figures in parentheses can be reduced if 3 kg-content bags are used to pack boneless meat.

B-30. Ice Plant at Alexandria

1) Location

The proposed ice plant will produce ice for cooling fish to be landed at Alexandria fishing port to be forwarded to the Greater Cairo. It is, therefore, desirable to locate the site of this ice plant along an Alexandria-Cairo trunk road at the area as close as possible to the port. The site will require an area of 5,200 square meters (80 m x 65 m).

2) Outline of Facilities and Capacities

The proposed ice plant will have the following capacities.

Ice making: 100 tons per day

Ice storage: 200 tons per day

3) Design Concept

a) Schematic Plan

A truck berth will be constructed at the eastern and southern sides of the ice storage. The daily loading works of ice will be made at the eastern portion facing the parking area, and the southern portion is used for loading in the busy seasons.

b) Building Plan

A building plan has been formulated to meet the following requirements:

- To meet the local natural conditions such as meteorological conditions

- To simplify the flow of products and operation procedures
- To simplify and make compact the building plan and design
- To provide each working zone with an entrance to be used exclusively
- To reduce energy consumption
- To secure easy O/M works

4) Architectural Plan

a) Zone Plan

The ice plant is roughly divided into five zones; central zone, the ice making zone, ice storage zone, office zone, and equipment zone.

° Office zone

The office zone will be provided at the inner-most part of the platform facing the parking area for having access of trucks as well as a good view of the truck berth from the zone.

° Ice making, storage, and handling zones

These zones will be arranged so as to make the flow of works smooth from ice making to loading.

° Equipment Zone

The equipment zone will be placed behind the ice making room in consideration of its functions.

b) Cross-sectional plan

The clearance between ceiling and floor of the ice making room is so designed to be four meters for installing the ice making equipment while that of the storage 3.4 meters.

5) Refrigeration, Water Supply, Sewerage and Electricity Supply

a) Refrigeration System

The following machines are required for the refrigeration system;

- Ammonia compressors 3 units

Type: Single-staged compound and screw type

Capacity: Approx. 320,000 Kcal/hr x 180 KW x 2 units
(-40°C for Evaporating temp. and +40°C
for Condensing temp.)
(-15°C for Evaporating temp. and +40°C
for Condensing temp.)

Accessories: Cage rotor type electric motors, reactor
type starters, oil separators, oil coolers,
oil pumps, oil filters, common beds,
pressure gauges (high, low, oil), pressure
switches (high-cut, oil protection),
suction filters, various stop valves, and
so on.

- Ammonia condensers 2 units

Type: Evaporation type

Capacity: Approx. 140 refrigerating tons each

Accessories: Multi-vane type fan, circulating water
pump, various stop valves, mounting
support, and others.

- Ammonia receivers 2 units

Type: Horizontal cylinder type

Capacity: Approx. 1,500 lit.

Accessories: Level gauges, mounting support, various stop valves, and others

- Air coolers 2 units

Type: Plate fin and hot water defrosting type

Cooling surface:

Approx. 100 m² x each

Accessories: Fans, defrosting nozzle and fittings, expansion valves, solenoid valves, various stop valves, and so on.

- Brine cooling coil: 2 sets

Type: Herringbone type

Accessories: Float valves, mounting support, and others.

- Ammonia Accumulator 3 units

Type: Vertical cylinder type

Accessories: Check valves, various stop valves, and others.

- Ammonia piping system for refrigeration machine and equipments 1 complete set

- Ice making tanks 2 units

Dimensions: Approx. 6 m x 16 m x 1.3 m

- Brine agitators 2 units

- Dipping tanks		<u>2 units</u>
- Can dumps		<u>2 units</u>
- Automatic raw water filling tanks		<u>2 units</u>
- Raw water pumps		<u>2 units</u>
- Raw water filter		<u>1 unit</u>
- Core water sucker pump unit		<u>1 set</u>
Type:	Plunger type	
Accessories:	Electric motor, sucker nozzle, hose, and other.	
- Air blower		<u>1 unit</u>
Type:	Rotary type	
Accessories:	Electric motor, air tank, and others	
- Raw water pre-cooling tank		<u>1 unit</u>
- Pre-cooling water circulation pump		<u>1 unit</u>
- Overhead electric crane		<u>2 units</u>
- Water and air piping for ice making plant		<u>1 complete set</u>
- Ice can		
capacity:	25 kg each	<u>2,500 units</u>
- Can grid		
capacity:	24 ice cans	<u>100 units</u>

b) Water Supply and Sewerage System

The following equipment is required for water supply and sewerage systems. The municipal water supply and sewerage must be easily available in the building site;

- Water receiving tank 1 set

One water receiving tank made of reinforced concrete with capacity of about 50 m^3 shall be provided underground outside machine room under the evaporative condenser and various type of pump.

- Water supply hydrophone units 2 sets

Type: Horizontal centrifugal type
Capacity: $7 \text{ m}^3/\text{h} \times 14 \text{ m} \times 0.75 \text{ KW}$

- Appliance for water works 1 unit

- Water pipe unit in the compound 1 unit

- Fire fighting cock 1 unit

- Fire fighting pump 1 unit

Type: Horizontal centrifugal type
Capacity: $15 \text{ m}^3/\text{hr} \times 40 \text{ m} \times 3.7 \text{ KW}$

- Drain ditches, pipes, boxes, and others 1 complete set

- Sewerage for Lavatory 1 complete set

- Air conditioner for office 1 complete set

c) Electric Equipment

The following facilities and equipment are required and primary electricity (380 V for power and 200 V for lighting) is to be supplied at the building site.

- Main switch board 1 unit
- Central control panel 1 unit
- Diesel generator for emergency use with complete set of common bed and accessories 2 units

Capacity: Approx. 250 KVA x 1 set
 50 KVA x 1 set

- Generator control panel 1 unit
- Lighting 1 complete set

The fitting should be of water-proof type with incandescent bulbs for the cold rooms

- Electric wiring and accessories 1 complete set

B-31. Cost Estimation

TABLE B-31-1. DISBURSEMENT SCHEDULE OF INITIAL INVESTMENT COST (FINANCIAL)

(Unit: L.E 1,000)

Item	Total		1985		1986	
	F/C	L/C	F/C	L/C	F/C	L/C
1. Foundation Works	-	4,428	-	3,100	-	1,328
2. Building Works	13,489	3,243	9,442	2,270	4,047	973
3. Cooling Equipments	5,540	689	3,878	482	1,662	207
4. Meat Processing Facility	2,040	360	1,428	252	612	108
5. Pallet	-	1,270	-	-	-	1,270
6. Insulated Truck and Forklift	1,417	-	-	-	1,417	-
Sub-total	22,486	9,990	14,748	6,104	7,738	3,886
7. Project Administration	-	3,248	-	2,085	-	1,163
8. Consulting Services	2,183	594	1,310	356	873	238
9. Training Program	140	-	84	-	56	-
10. Physical Contingency	2,107	1,221	1,475	855	632	366
Total (1 to 10)	26,916	15,053	17,617	9,400	9,299	5,653
11. Price Contingency	6,573	5,702	3,876	3,102	2,697	2,600
Grand Total (1 to 11)	33,489	20,755	21,493	12,502	11,996	8,253
	(61.7%)	(38.3%)	(100%)			

TABLE B-31-2. DISBURSEMENT SCHEDULE OF INITIAL INVESTMENT COST (FINANCIAL)

(Unit: L.E 1,000)

-Excluding Ice Plant-

Item	Total		1985		1986	
	F/C	L/C	F/C	L/C	F/C	L/C
1. Foundation Works	-	4,227	-	2,959	-	1,268
2. Building Works	13,048	3,114	9,386	2,180	3,662	934
3. Cooling Equipments	4,674	531	3,272	372	1,402	159
4. Meat Processing Facility	2,040	360	1,428	252	612	108
5. Pallet	-	1,270	-	-	-	1,270
6. Insulated Truck and Forklift	1,417	-	-	-	1,417	-
Sub-total	21,179	9,502	14,086	5,763	7,093	3,739
7. Project Administration		3,068	-	1,985	-	1,083
8. Consulting Services	2,056	559	1,234	335	822	224
9. Training Program	132	-	79	-	53	-
10. Physical Contingency	1,976	1,162	1,383	813	593	349
Total (1 to 10)	25,343	14,291	16,782	8,896	8,561	5,395
11. Price Contingency	6,175	5,418	3,692	2,936	2,483	2,482
Grand Total (1 to 11)	31,518	19,709	20,474	11,832	11,044	7,877
	(61.5%)	(38.5%)		(100%)		

TABLE B-31-3. DISBURSEMENT SCHEDULE OF INITIAL INVESTMENT COST (FINANCIAL)

(Unit: L.E 1,000)

Item	Total		1985		1986	
	F/C	L/C	F/C	L/C	F/C	L/C
1. Foundation Works	-	3,066	-	2,146	-	920
2. Building Works	9,048	11,157	6,334	1,476	2,714	633
3. Cooling Equipments	3,578	3,987	2,505	286	1,073	123
4. Meat Processing Facility	1,020	1,200	714	126	306	54
5. Pallet	-	890	-	-	-	890
6. Insulated Truck and Forklift	900	900	-	-	900	-
Sub-total	14,546	21,200	9,553	4,034	4,993	2,620
7. Project Administration	-	2,120	-	1,359	-	761
8. Consulting Services	1,412	1,796	847	230	565	154
9. Training Program	91	91	55	-	36	-
10. Physical Contingency	1,364	2,183	955	573	409	246
Total (1 to 10)	17,413	27,390	11,410	6,196	6,003	3,781
11. Price Contingency	4,251	8,035	2,510	2,045	1,741	1,739
Grand Total (1 to 11)	21,664	35,425	13,920	8,241	7,744	5,520
	(61.2%)	(38.8%)		(100%)		

-Excluding El Dekihla and Ice Plant-

TABLE B-31-4. BASE COST AND PHYSICAL CONTINGENCY

Name: ABBAS

(Unit: L.E)

	<u>F/C</u>	<u>L/C</u>	<u>Total</u>
1. Building Works			
1-1. Temporary Works	5,000	19,900	24,900
1-2. Building Works	570,000	163,800	733,800
1-3. Supervisor (for 1-2)	19,300	-	19,300
1-4. Mechanical Works	16,600	7,100	23,700
1-5. Electrical Works	25,300	10,800	36,100
1-6. Supervisor (for 1-4 & 1-5)	16,700	-	16,700
1-7. Dispatch	186,200	-	186,200
1-8. Freight	410,500	21,900	432,400
1-9. General Expenses	34,200	51,300	85,500
1-10. Sub-total	1,283,800	274,800	1,558,600
2. Foundation Works	-	392,000	392,000
3. Cooling Equipment	584,700	71,100	655,800
4. Meat Processing Facility	-	-	-
5. Pallet	-	130,000	130,000
6. Insulated Truck & Forklift	216,700	-	216,700
7. Base Cost (1 to 6)	2,085,200	867,900	2,953,100
8. Physical Contingency	186,900	106,400	293,300
9. Total (7 + 8)	2,252,100	994,300	3,246,400

TABLE B-31-5. BASE COST AND PHYSICAL CONTINGENCY

Name: SHERIF

(Unit: L.E)

	<u>F/C</u>	<u>L/C</u>	<u>Total</u>
1. Building Works			
1-1. Temporary Works	6,500	26,200	32,700
1-2. Building Works	760,100	221,200	981,300
1-3. Supervisor (for 1-2)	19,300	-	19,300
1-4. Mechanical Works	19,500	8,400	27,900
1-5. Electrical Works	31,800	13,600	45,400
1-6. Supervisor (for 1-4 & 1-5)	16,700	-	16,700
1-7. Dispatch	186,200	-	186,200
1-8. Freight	550,300	29,300	579,600
1-9. General Expenses	44,900	67,400	112,300
1-10. Sub-total	1,635,300	366,100	2,001,400
2. Foundation Works	-	662,000	662,000
3. Cooling Equipment	665,000	78,500	743,500
4. Meat Processing Facility			
5. Pallet	-	190,000	190,000
6. Insulated Truck & Forklift	250,000	-	250,000
7. Base Cost (1 to 6)	2,550,300	1,296,600	3,846,900
8. Physical Contingency	230,000	162,800	392,800
9. Total (7 + 8)	2,780,300	1,459,400	4,239,700

TABLE B-31-6. BASE COST AND PHYSICAL CONTINGENCY

Name: <u>SUEZ</u>	(Unit: L.E)		
	<u>F/C</u>	<u>L/C</u>	<u>Total</u>
1. Building Works			
1-1. Temporary Works	7,200	28,800	36,000
1-2. Building Works	816,200	256,300	1,072,500
1-3. Supervisor (for 1-2)	38,300	-	38,300
1-4. Mechanical Works	19,100	8,200	27,300
1-5. Electrical Works	30,800	13,200	44,000
1-6. Supervisor (for 1-4 & 1-5)	16,700	-	16,700
1-7. Dispatch	186,200	-	186,200
1-8. Freight	548,100	29,200	577,300
1-9. General Expenses	49,400	74,100	123,500
1-10. Sub-total	1,712,000	409,800	2,121,800
2. Foundation Works		360,600	360,600
3. Cooling Equipment	681,800	78,500	760,300
4. Meat Processing Facility			
5. Pallet	-	190,000	190,000
6. Insulated Truck & Forklift	266,700	-	266,700
7. Base Cost (1 to 6)	2,660,500	1,038,900	3,699,400
8. Physical Contingency	239,400	121,900	361,300
9. Total (7 + 8)	2,899,900	1,160,800	4,060,700

TABLE B-31-7. BASE COST AND PHYSICAL CONTINGENCY

Name: <u>GHAMRA</u>	(Unit: L.E)		
	<u>F/C</u>	<u>L/C</u>	<u>Total</u>
1. Building Works			
1-1. Temporary Works	6,900	27,500	34,400
1-2. Building Works	784,200	226,100	1,010,300
1-3. Supervisor (for 1-2)	38,300	-	38,300
1-4. Mechanical Works	21,300	9,100	30,400
1-5. Electrical Works	34,200	14,700	48,900
1-6. Supervisor (for 1-4 & 1-5)	16,700	-	16,700
1-7. Dispatch	186,200	-	186,200
1-8. Freight	570,500	45,600	616,100
1-9. General Expenses	47,200	70,700	117,900
1-10. Sub-total	1,705,500	393,700	2,099,200
2. Foundation Works	-	932,900	932,900
3. Cooling Equipment	693,700	83,500	777,200
4. Meat Processing Facility			
5. Pallet		190,000	190,000
6. Insulated Truck & Forklift	83,300	-	83,300
7. Base Cost (1 to 6)	2,482,500	1,600,100	4,082,600
8. Physical Contingency	239,900	206,700	446,600
9. Total (7 + 8)	2,722,400	1,806,800	4,529,200

TABLE B-31-8. BASE COST AND PHYSICAL CONTINGENCY

Name: RAMADA

(Unit: L.E)

	<u>F/C</u>	<u>L/C</u>	<u>Total</u>
1. Building Works			
1-1. Temporary Works	11,300	45,200	56,500
1-2. Building Works	1,264,100	377,100	1,641,200
1-3. Supervisor (for 1-2)	51,100	-	51,100
1-4. Mechanical Works	44,200	18,900	63,100
1-5. Electrical Works	77,100	33,000	110,100
1-6. Supervisor (for 1-4 & 1-5)	16,700	-	16,700
1-7. Dispatch	239,400	-	239,400
1-8. Freight	930,600	74,400	1,005,000
1-9. General Expenses	77,500	116,300	193,800
1-10. Sub-total	2,712,000	664,900	3,376,900
2. Foundation Works	-	718,800	718,800
3. Cooling Equipment	952,200	97,200	1,049,400
4. Meat Processing Facility	1,020,000	180,000	1,200,000
5. Pallet	-	190,000	190,000
6. Insulated Truck & Forklift	83,300	-	83,300
7. Base Cost (1 to 6)	4,767,500	1,850,900	6,618,400
8. Physical Contingency	468,400	221,000	689,400
9. Total (7 + 8)	5,235,900	2,071,900	7,307,800

TABLE B-31-9. BASE COST AND PHYSICAL CONTINGENCY

Name: El Dekihla
(Alexandria)

(Unit: L.E)

	<u>F/C</u>	<u>L/C</u>	<u>Total</u>
1. Building Works			
1-1. Temporary Works	17,000	67,900	84,900
1-2. Building Works	1,936,200	569,200	2,505,400
1-3. Supervisor (for 1-2)	51,100	-	51,100
1-4. Mechanical Works	66,100	28,300	94,400
1-5. Electrical Works	114,000	48,900	162,900
1-6. Supervisor (for 1-4 & 1-5)	16,700	-	16,700
1-7. Dispatch	239,400	-	239,400
1-8. Freight	1,442,500	115,400	1,557,900
1-9. General Expenses	116,600	174,900	291,500
1-10. Sub-total	3,999,600	1,004,600	5,004,200
2. Foundation Works		1,160,900	1,160,900
3. Cooling Equipment	1,096,100	122,100	1,218,200
4. Meat Processing Facility	1,020,000	180,000	1,200,000
5. Pallet		380,000	380,000
6. Insulated Truck & Forklift	516,700	-	516,700
7. Base Cost (1 to 6)	6,632,400	2,847,600	9,480,000
8. Physical Contingency	611,600	342,800	954,400
9. Total (7 + 8)	7,224,000	3,190,400	10,434,400

TABLE B-31-10. BASE COST AND PHYSICAL CONTINGENCY

Name: <u>ICE PLANT</u> (Alexandria)	(Unit: L.E)		
	<u>F/C</u>	<u>L/C</u>	<u>Total</u>
1. Building Works			
1-1. Temporary Works	2,100	8,200	10,300
1-2. Building Works	184,400	73,700	258,100
1-3. Supervisor (for 1-2)	16,900	-	16,900
1-4. Mechanical Works	14,900	6,400	21,300
1-5. Electrical Works	21,100	9,000	30,100
1-6. Supervisor (for 1-4 & 1-5)	16,700	-	16,700
1-7. Dispatch	34,800	-	34,800
1-8. Freight	135,600	10,800	146,400
1-9. General Expenses	14,100	21,200	35,300
1-10. Sub-total	440,600	129,300	569,900
2. Foundation Works	-	201,200	201,200
3. Cooling Equipment	866,400	158,100	1,024,500
4. Meat Processing Facility			
5. Pallet			
6. Insulated Truck & Forklift			
7. Base Cost (1 to 6)	1,307,000	488,600	1,795,600
8. Physical Contingency	130,700	58,900	189,600
9. Total (7 + 8)	1,437,700	547,500	1,985,200

Table B-31-11. Cost Estimate for Consulting Services

I. Foreign Currency Portion (in 1,000 Yen)

A. Remuneration		
1. Detailed Design	2,000 x 136 M/M	272,000
2. Supervision	2,000 x 114 M/M	228,000
3. Sub-total		500,000
B. Direct Cost		
1. International Travel		
Air Fare	700 x 51 trips	35,700
Excess	110 x 51 "	5,610
Sub-total		41,310
2. Reimbursable Cost		
Cost of Communication	100 x 24 months	2,400
Equipments, Office Supplies, etc.		10,000
Sub-total		12,400
3. Total		53,710
C. Unallocated Contingency (Appr. 10% of above)		59,980
D. Grand Total		655,000

II. Local Currency Portion (In LE)

A. Per diem, subsistence and Housing Allowance		
	250 M/M x 30 x LE 50	375,000
B. Local Transportation (LE 40 x 5 x 30 x 24)		144,000
C. Local Communication and Others (LE 300 x 24)		7,200
D. Printing (L.S.)		15,000
E. Unallocated Contingency		52,800
F. Grand Total		594,000

Table B-31-12. Cost of Training Program

I. Required Man-Month

<u>Training Item</u>	<u>No. of Trainee</u>	<u>Training Period</u> (month)	<u>Man.Month</u>
1. Cold Storage			
Managerial Aspect	5	3	15
Mechanical Aspect	5	4	20
2. Meat Processing			
Operation/Management	3	3	9
3. Ice Making			
Mechanical Aspect	1	2	2
<u>Total</u>	<u>14</u>	<u>-</u>	<u>46</u>

(Unit: ¥1,000)

II. Required Cost

1. Air Fare (Cairo-Tokyo-Cairo)	@700/trip	9,800
2. Excess Baggage (20 kg)	@11/kg/round trip	3,080
3. Outfitting Allowances	@120/person	1,680
4. Per Diem Allowances	@450/man-month	20,700
5. General Expenses ^{1/}	@100/man-month	4,600
6. Sub-total		39,860
7. Administrative Expenses ^{2/}		2,140
8. Total		42,000

(LE 140,000)

Note: ^{1/} Transportation and miscellaneous expenses including fare for train, airplane, hired car, taxi and other transportation for trainee, trainer and attendants, travel and accommodation allowances for trainer and attendants, expenses for data arrangement, lecturing, and so forth.

^{2/} Approximate 5% of total cost of items 1 to 5.

Breakdown of Construction Cost (Building)

Name: Abbas (2,000 ton) (Unit: LE)

Item	Unit	Quantity	F/C		L/C		Total Amount
			Price	Amount	Price	Amount	
Prefab. Steel Structure	ton	167.8	533.53	89,490	155.53	22,570	111,860
Wall	87 m ²	-	46.67	-	-	-	-
	102 m ²	-	61.53	-	-	-	-
	177 m ²	1,752	74.53	130,220	-	-	130,220
Panel	62 m ²	-	52.53	-	-	-	-
	77 m ²	-	70.00	-	-	-	-
Roofing	152 m ²	1,529.4	91.67	121,820	-	-	121,820
	Outer Wall	1,299.8 m ²	15.00	19,490	5.00	6,490	25,980
Interior	Outer Wall	1,987.1 m ²	6.00	11,920	4.53	8,600	20,520
	Wall	726 m ²	21.67	15,750	8.53	6,040	21,770
Miscellaneous	Acoustic T.	187.2 m ²	10.00	1,870	10.00	1,870	3,740
	Asbesto	298.6 m ²	-	-	20.00	5,970	5,970
Total	-	L.S	-	179,460	-	112,460	291,920
				570,000		163,800	733,800

Breakdown of Cooling Equipment

Abbas (2,000 ton)

(Unit: LE)

Item	F/C	L/C	Total
1. Ammonia Compressor	74,400	-	74,400
2. Cooler	20,600	-	20,600
3. High Pressure Equipment	19,700	-	19,700
4. Low Pressure Equipment	6,700	-	6,700
5. Piping Material	69,400	-	69,400
6. Air Conditioner	-	-	-
7. Heat Insulating Pipe Cover	16,700	-	16,700
8. Diesel Generator	73,900	-	73,900
9. Control Panel	52,300	-	52,300
10. Water Pump and Tank	3,000	14,200	17,200
11. Delivery and Installation	3,500	31,500	35,000
12. Electric Works	65,300	5,300	70,600
13. Miscellaneous Materials	70,000	1,800	71,800
14. Fuel and Oil	-	1,300	1,300
15. Sanitation Facilities	-	-	-
16. Freight and Insurance	87,800	9,800	97,600
17. General Expense	21,400	7,200	28,600
18. Total	584,700	71,100	655,800

Breakdown of Construction Cost (Building)

(Unit: LE)

Name: Serif (3,000 ton)

Item	Unit	Quantity	F/C		L/C		Total Amount
			Price	Amount	Price	Amount	
Prefab. Steel Structure	ton	220.0	533.33	117,350	153.33	29,530	146,660
Wall	87 m ²	-	46.67	-	-	-	-
	102 m ²	-	61.53	-	-	-	-
	177 m ²	2,116.0	74.33	157,280	-	-	157,280
Panel	62 m ²	223.0	52.33	11,660	-	-	11,660
	77 m ²	-	70.0	-	-	-	-
Roofing	152 m ²	1,682.0	91.67	154,180	-	-	154,180
	m ²	2,715.0	15.00	40,720	5.00	13,570	54,290
Outer Wall	m ²	2,184.7	6.00	13,100	4.33	9,450	22,550
	Sandwich Panel	1,258.0	21.67	26,820	8.33	10,310	37,130
Interior Ceiling	Acoustic T.	149.0	10.00	1,490	10.00	1,490	2,980
	Asbesto	352.0	-	-	20.00	7,040	7,040
Miscellaneous	-	L.S	-	237,520	-	150,010	387,530
Total	-	-	-	760,100	-	221,200	981,300

Breakdown of Cooling Equipment

Sherif (3,000 ton)

(Unit: LE)

Item	F/C	L/C	Total
1. Ammonia Compressor	77,600	-	77,600
2. Cooler	27,000	-	27,000
3. High Pressure Equipment	21,900	-	21,900
4. Low Pressure Equipment	8,700	-	8,700
5. Piping Material	81,000	-	81,000
6. Air Conditioner	-	-	-
7. Heat Insulating Pipe Cover	18,300	-	18,300
8. Diesel Generator	83,100	-	83,100
9. Control Panel	57,300	-	57,300
10. Water Pump and Tank	3,000	14,200	17,200
11. Delivery and Installation	4,000	36,000	40,000
12. Electric Works	67,700	5,300	73,000
13. Miscellaneous Materials	93,300	2,400	95,700
14. Fuel and Oil	-	1,500	1,500
15. Sanitation Facilities	-	-	-
16. Freight and Insurance	97,500	10,800	108,300
17. General Expense	24,600	8,300	32,900
18. Total	665,000	78,500	743,500

Breakdown of Construction Cost (Building)

Name: Suez (5,000 ton)

(Unit: LE)

Item	Unit	Quantity	F/C		L/C		Total Amount
			Price	Amount	Price	Amount	
Prefab. Steel Structure	ton	212	533.33	113,060	133.33	28,260	141,320
Wall	87 m ²	560	46.67	26,130	-	-	26,130
	102 m ²	-	61.33	-	-	-	-
	177 m ²	2,240	74.33	166,490	-	-	166,490
Panel	62 m ²	416	52.33	21,760	-	-	21,760
	77 m ²	-	70.00	-	-	-	-
Roofing	152 m ²	1,500	91.67	137,500	-	-	137,500
	m ²	2,570	15.00	38,550	5.00	12,850	51,400
Outer Wall	m ²	2,056	6.00	12,220	4.33	8,820	21,040
	Asbesto m ²	1,191	-	-	13.33	15,870	15,870
Interior	Acoustic m ²	164	10.00	1,640	10.00	1,640	3,280
	Asbesto m ²	270	-	-	20.00	5,400	5,400
Miscellaneous	-	L.S	-	298,850	-	183,460	482,310
Total	-	-	-	816,200	-	256,500	1,072,500

Breakdown of Cooling Equipment

Suez (3,000 ton)

(Unit: LE)

Item	F/C	L/C	Total
1. Ammonia Compressor	77,600	-	77,600
2. Cooler	29,000	-	29,000
3. High Pressure Equipment	21,900	-	21,900
4. Low Pressure Equipment	8,700	-	8,700
5. Piping Material	87,900	-	87,900
6. Air Conditioner	-	-	-
7. Heat Insulating Pipe Cover	18,300	-	18,300
8. Diesel Generator	93,100	-	93,100
9. Control Panel	57,300	-	57,300
10. Water Pump and Tank	3,000	12,000	15,000
11. Delivery and Installation	4,000	36,000	40,000
12. Electric Works	67,700	5,300	73,000
13. Miscellaneous Materials	93,300	2,400	95,700
14. Fuel and Oil	-	1,500	1,500
15. Sanitation Facilities	-	-	-
16. Freight and Insurance	97,500	10,800	108,300
17. General Expense	22,500	10,500	33,000
18. Total	681,800	78,500	760,300

Breakdown of Construction Cost (Building)

(Unit: LE)

Name: Ghamra (3,000 ton)

Item	Unit	Quantity	F/C		L/C		Total Amount
			Price	Amount	Price	Amount	
Prefab. Steel Structure	ton	234.5	553.53	125,060	153.33	31,260	156,320
Wall	87 m ²	-	46.67	-	-	-	-
	102 m ²	-	61.33	-	-	-	-
	177 m ²	2,240	74.33	166,490	-	-	166,490
Ceiling	62 m ²	201.6	52.33	10,540	-	-	10,540
	77 m ²	-	70.00	-	-	-	-
	152 m ²	1,680	91.67	154,000	-	-	154,000
Roofing	m ²	2,780.4	15.00	41,700	5.00	13,900	55,600
Outer Wall	m ²	2,252.2	6.00	13,510	4.53	9,750	23,260
Interior	Wall	1,154	21.67	25,000	8.33	9,610	34,610
	Sandwich P	-	-	-	-	-	-
	Acoustic T.	201.6	10.00	2,010	10.00	2,010	4,020
Miscellaneous	Ceiling	272.0	-	-	20.00	5,440	5,440
	Asbesto	-	-	-	-	-	-
Total	-	L.S	-	245,890	-	154,130	400,020
	-	-	-	784,200	-	226,100	1,010,300

Breakdown of Cooling Equipment

Ghamra (3,000 ton)

(Unit: LE)

Item	F/C	L/C	Total
1. Ammonia Compressor	77,600	-	77,600
2. Cooler	26,500	-	26,500
3. High Pressure Equipment	21,900	-	21,900
4. Low Pressure Equipment	8,700	-	8,700
5. Piping Material	82,300	-	82,300
6. Air Conditioner	-	-	-
7. Heat Insulating Pipe Cover	18,300	-	18,300
8. Diesel Generator	83,100	-	83,100
9. Control Panel	57,300	-	57,300
10. Water Pump and Tank	3,000	14,200	17,200
11. Delivery and Installation	4,000	36,000	40,000
12. Electric Works	67,800	6,800	74,600
13. Miscellaneous Materials	93,300	2,400	95,700
14. Fuel and Oil	-	1,500	1,500
15. Sanitation Facilities	-	-	-
16. Freight and Insurance	123,000	13,700	136,700
17. General Expense	26,900	8,900	35,800
18. Total	693,700	83,500	777,200

Breakdown of Construction Cost (Building)

Name: Ramada (3,000 ton) (Unit: LE)

Item	Unit	Quantity	F/C		L/C		Total Amount
			Price	Amount	Price	Amount	
Prefab. Steel Structure	ton	450.4	533.33	240,210	133.33	60,050	300,260
Wall	m ²	615.0	46.67	28,700	-	-	28,700
	m ²	-	61.33	-	-	-	-
	m ²	177	74.33	188,560	-	-	188,560
Panel	m ²	1,266	52.33	66,240	-	-	66,240
	m ²	77	70.00	-	-	-	-
Roofing	m ²	2,032	91.67	186,270	-	-	186,270
Outer Wall	m ²	5,119	15.00	76,780	5.00	25,590	102,370
	m ²	3,602.5	6.00	21,610	4.33	15,590	37,200
Interior	Sandwich Panel	1,512	21.67	32,760	8.33	12,590	45,350
	Acoustic T.	400	10.00	4,000	10.00	4,000	8,000
	Asbesto	584	-	-	20.00	7,680	7,680
Miscellaneous	-	L.S	-	419,170	-	251,600	670,770
Total	-	-	-	1,264,100	-	377,100	1,641,200

Breakdown of Cooling Equipment

(Unit: LE)

Ramada (3,000 ton)			
Item	F/C	L/C	Total
1. Ammonia Compressor	103,100	-	103,100
2. Cooler	34,100	-	34,100
3. High Pressure Equipment	23,900	-	23,900
4. Low Pressure Equipment	9,400	-	9,400
5. Piping Material	92,400	-	92,400
6. Air Conditioner	82,900	-	82,900
7. Heat Insulating Pipe Cover	18,300	-	18,300
8. Diesel Generator	170,800	-	170,800
9. Control Panel	68,300	-	68,300
10. Water Pump and Tank	3,300	15,500	18,800
11. Delivery and Installation	5,000	45,000	50,000
12. Electric Works	82,300	7,700	90,000
13. Miscellaneous Materials	93,300	2,400	95,700
14. Fuel and Oil	-	1,700	1,700
15. Sanitation Facilities	-	-	-
16. Freight and Insurance	135,300	15,000	150,300
17. General Expense	29,800	9,900	39,700
18. Total	952,200	97,200	1,049,400

Breakdown of Construction Cost (Building)

Name: Alexandria (6,000 ton) (Unit: LE)

Item	Unit	Quantity	F/C		L/C		Total Amount
			Price	Amount	Price	Amount	
Prefab. Steel Structure	ton	727.5	533.33	587,890	133.33	96,970	484,860
Wall	m ²	460	46.67	21,460	-	-	21,460
	m ²	-	61.33	-	-	-	-
	m ²	5,778	74.33	280,810	-	-	280,810
Ceiling	m ²	1,404	52.33	73,470	-	-	73,470
	m ²	-	70.00	-	-	-	-
Roofing	m ²	3,507	91.67	321,480	-	-	321,480
	m ²	7,776	15.00	116,640	5.00	38,880	155,520
Outer Wall	m ²	3,441	6.00	20,640	4.33	14,890	35,530
	m ²	1,338	21.67	28,990	8.33	11,140	40,130
Interior	Acoustic P.	635	10.00	6,350	10.00	6,350	12,700
	Ceiling	418	-	-	20.00	8,360	8,360
	Miscellaneous	L.S.	-	678,470	-	392,610	1,071,080
Total	-	-	-	1,936,200	-	569,200	2,505,400

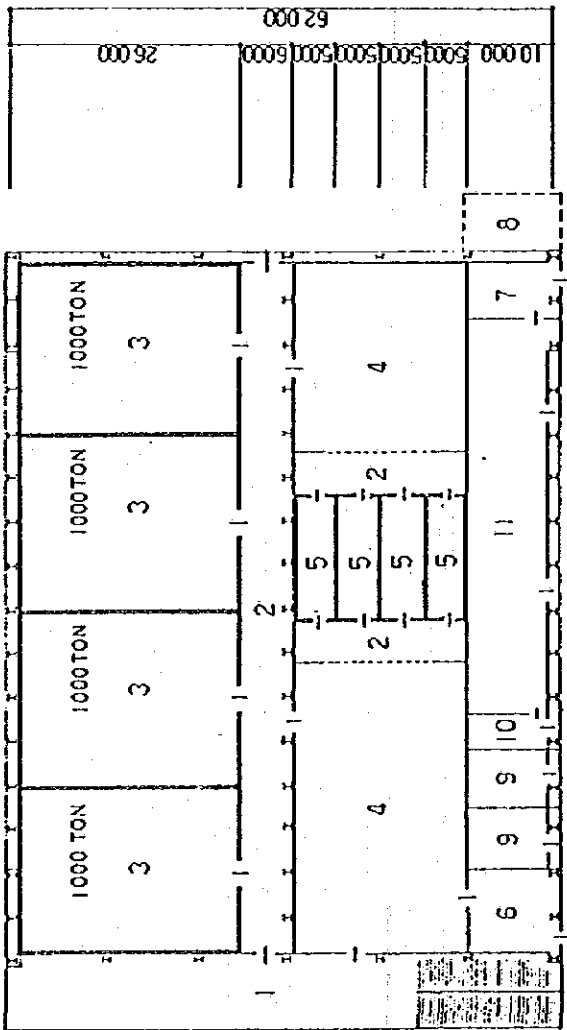
Breakdown of Cooling Equipment

Alexandria (6,000 ton)

(Unit: LE)

Item	F/C	L/C	Total
1. Ammonia Compressor	112,200	-	112,200
2. Cooler	41,800	-	41,800
3. High Pressure Equipment	31,400	-	31,400
4. Low Pressure Equipment	11,300	-	11,300
5. Piping Material	105,900	-	105,900
6. Air Conditioner	85,500	-	85,500
7. Heat Insulating Pipe Cover	22,000	-	22,000
8. Diesel Generator	180,800	-	180,800
9. Control Panel	81,000	-	81,000
10. Water Pump and Tank	3,700	16,900	20,600
11. Delivery and Installation	7,000	63,000	70,000
12. Electric Works	113,500	2,300	115,800
13. Miscellaneous Materials	116,700	3,000	119,700
14. Fuel and Oil	-	2,500	2,500
15. Sanitation Facilities	700	6,000	6,700
16. Freight and Insurance	146,300	16,300	162,600
17. General Expense	36,300	12,100	48,400
18. Total	1,096,100	122,100	1,218,200

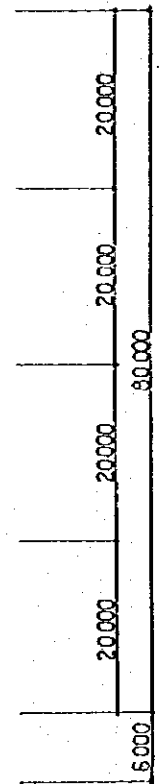
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- 1. PLATFORM
- 2. ANTE ROOM
- 3. COLD ROOM
- 4. PREPARATION AREA
- 5. FREEZING TUNNELS
- 6. STORE
- 7. WORK SHOP
- 8. COOLING TOWERS
- 9. ELECTRICAL ROOM
- 10. CONTROL ROOM
- 11. MACHINE ROOM



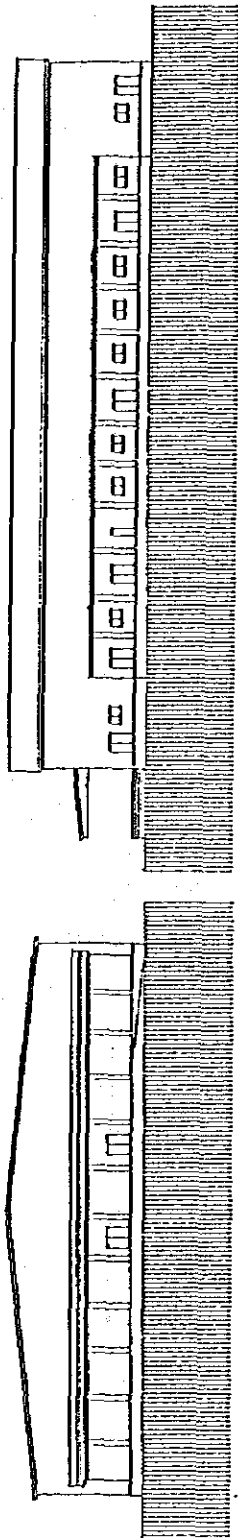
FLOOR AREA
4960 M²

4000 TON AND
FREEZING TUNNELS

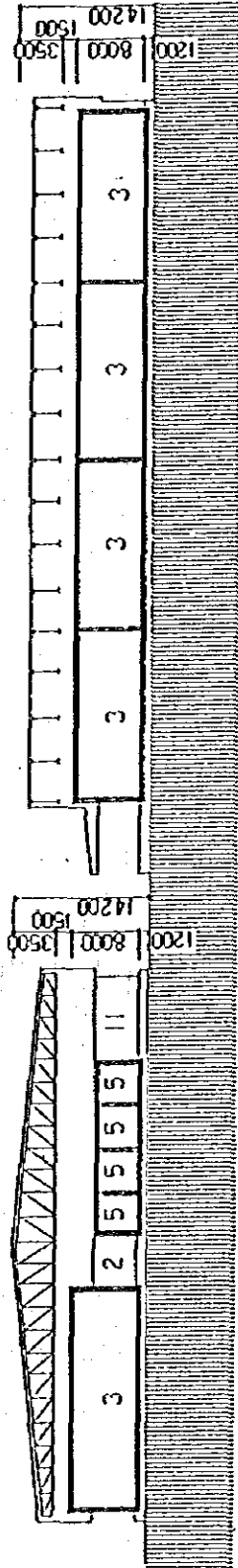
THE ARAB REPUBLIC OF EGYPT	
MINISTRY OF SUPPLY AND HOME TRADE	
COLD STORAGE CHAIN DEVELOPMENT PROJECT	
FLOOR PLAN (ALEXANDRIA)	
DATE	DWG NO.
JAPAN INTERNATIONAL COOPERATION AGENCY	



ELEVATIONS



SECTIONS



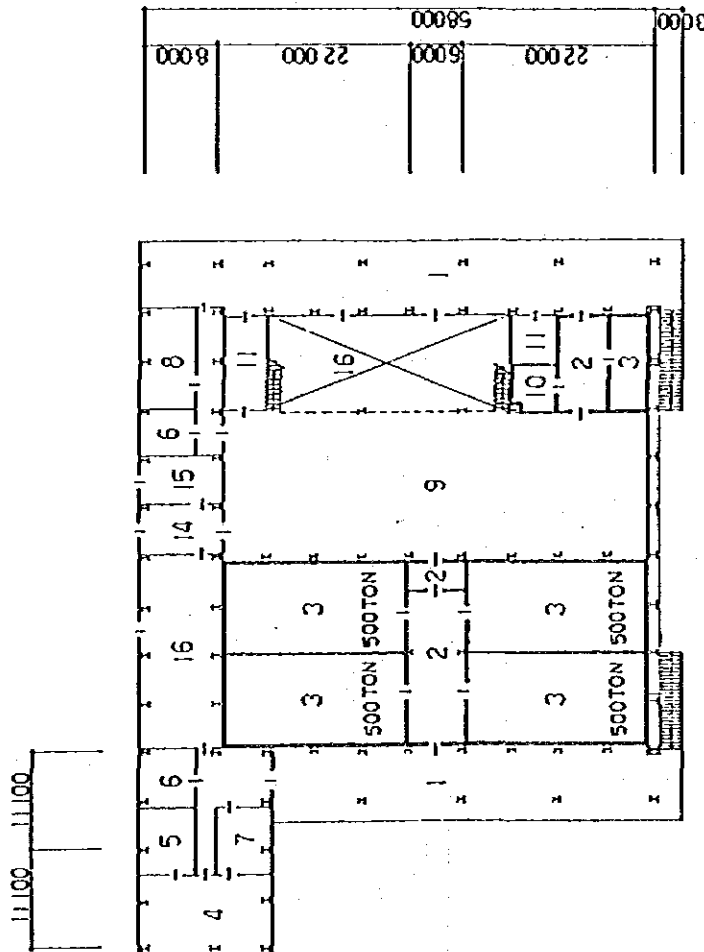
THE ARAB REPUBLIC OF EGYPT	
MINISTRY OF SUPPLY AND HOME TRADE	
COLD STORAGE CHAIN DEVELOPMENT PROJECT	
SECTIONS AND ELEVATIONS	
(ALEXANDRIA)	
DATE	DWG. NO.
JAPAN INTERNATIONAL COOPERATION AGENCY	

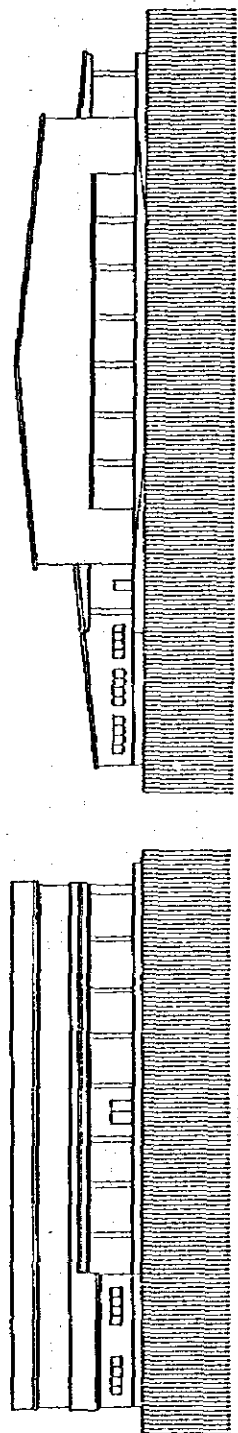
- | No. | ROOM NAME |
|-----|---------------------------------------|
| 1. | PLATFORM |
| 2. | ANTE ROOM |
| 3. | COLD ROOM |
| 4. | OFFICE |
| 5. | HEAD OFFICER'S ROOM |
| 6. | TOILET |
| 7. | LOCKER ROOM FOR COLD STORAGE DEPT. |
| 8. | LOCKER ROOM FOR MEAT PROCESSING DEPT. |
| 9. | MEAT PROCESSING ROOM |
| 10. | FREEZING ROOM |
| 11. | BONE STORAGE |
| 12. | CASE WASHER |
| 13. | MACHINE ROOM |
| 14. | CONTROL ROOM |
| 15. | ELECTRICAL ROOM |
| 16. | PACKAGE MATERIAL STORE AREA |

FLOOR AREA
4320 M²

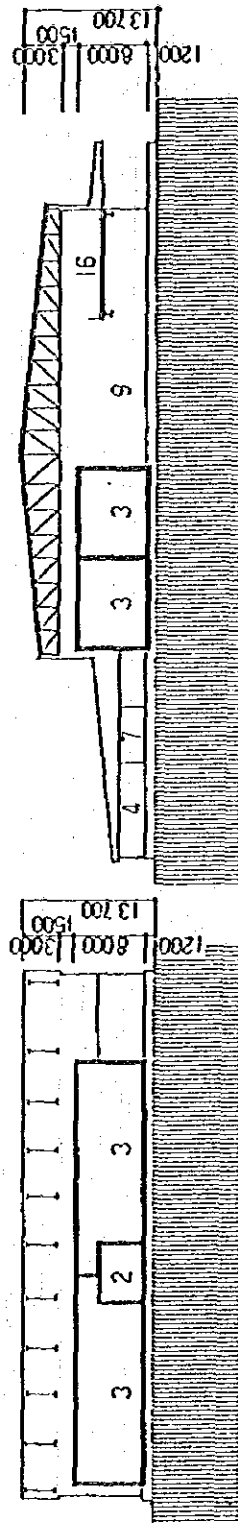
2000TON AND
MEAT PROCESSING

THE ARAB REPUBLIC OF EGYPT	
MINISTRY OF SUPPLY AND HOME TRADE	
COLD STORAGE CHAIN DEVELOPMENT PROJECT	
FLOOR PLAN (ALEXANDRIA)	
DATE	DWG NO.
JAPAN INTERNATIONAL COOPERATION AGENCY	





ELEVATIONS



SECTIONS



THE ARAB REPUBLIC OF EGYPT	
MINISTRY OF SUPPLY AND FOREIGN TRADE	
COLD STORAGE CHAIN DEVELOPMENT PROJECT	
SECTIONS AND ELEVATIONS (ALEXANDRIA)	
DATE	DWG. NO.
JAPAN INTERNATIONAL COOPERATION AGENCY	

EQUIPMENT AND FACILITIES OF 4,000 TON AND 2,000 TON COLD STORAGE IN ALEXANDRIA

1. Alexandria

(1) Capacity:

Cold storage room	2,000 ton (500 ton x 4 rooms)	-25°C - 0°C
Meat cold storage room	15 ton x 1 room	-25°C
Freezing room	4.25 ton x 1 room	18 hrs, -30°C
Anteroom	1 room	Approx. +10°C

(2) Estimated calorie under load:

	Entering heat from outside	Ventilation	Heat loss caused by cooling of stored goods	Fan for workers	Safety factor	Total (Kcal/hr)
Cold storage room	19,738	12,726	17,912	12,758	6,313	69,447
Anteroom	4,878	9,680		2,952	1,731	19,241
Freezing room	1,169		19,432	9,546	3,015	33,162
Meat cold storage room	2,046	2,416		1,785	625	6,872
Total	27,831	24,822	37,344	27,041	11,684	128,722Kcal/ hr (38.7 RT)

(3) Component machinery and equipment

<u>Description</u>	<u>Standard</u>	<u>Quantity</u>
Refrigerator		
For cold storage	Screw type double-step compressor, 75 kw	2 units
For spare	Screw type single-step compressor, 75 kw	1 unit
For freezing	Reciprocating multi-cylinder type double-step compressor, 37 kw	1 unit
Cooling unit		
For cold storage	On-floor type, 1.5 kw x 2 sets	4 units
For anteroom	Hanging type, 1.5 kw x 2 sets	1 unit
For freezing	Stand for freezing, 2.2 kw x 2 sets	1 unit
For meat cold storage	Hanging type, 1.5 kw x 1 set	1 unit

Evaporation type condenser	40 ton, which consists of fans (1.5 kw x 2 sets) and cooled water circulation pump (0.75 kw x 1 set)	3 units
Refrigerant reservoir pump	Horizontal cylinder type, 850 liter	2 units
For defrosting	65ø x 2.2 kw	1 unit
For processing meat	100ø x 2.2 kw	1 unit
For general usage	40ø x 0.75 kw	1 unit
For fire extinguish	50ø x 3.7 kw	1 unit
Air conditioning facilities	For meat processing room (+18°C), unit type approx. 28kw x 2 sets, fan 15 kw, air washer	2 units
Cooling tower	80 ton, 2.2 kw, circulation pump 100ø x 1 set	1 unit
Generator		
For drive power	Approx. 250 KVA	1 unit
For illumination	Approx. 100 KVA	1 unit
Fuel tank	10 kilo liter	1 unit
Ammonia high-low pressure piping materials & equipment		
Water piping, tank, etc.		1 lot (excluding plumbing & sanitary accommodations)
Control panel & wiring for out-power of transformer		1 lot
Handling		
Local-made pallets		Approx. 1,300pcs
Forklift	1.5 ton x 6 m in lift height	5 units
Air curtain	0.75 kw	3 units
Ammonia rejector & inspector		
2. Alexandria		
(1) Capacity:		
Cold storage room	4,000 ton (750 ton x 4 rooms)	-25°C, -0°C
Anteroom	1 room	Approx. +10°C
Freezing room (tunnel type)	10 ton/24 hrs x 4 rooms	-40°C

<u>Description</u>	<u>Standard</u>	<u>Quantity</u>
Generator		
For drive power	200 KVA and 270 KVA	each 2 units
For illumination	50 KVA	1 unit
Fuel tank	10 kiloliter	1 unit
Ammonia high-low piping, etc.		1 lot
Water piping, tank, etc.		1 lot (excl. plumbing & sanitary accommodations)
Control panel & wiring at out-power of transformer		1 lot
Handling		
Local-made pallets		Approx. 2,500 pcs
Forklift	1.5 ton x 6 m in lifting height	8 units
Air curtain	0.75 kw	2 units
Ammonia rejector and inspector		1 lot

COST FOR 4,000 TON COLD STORAGE

(Unit: L.E.)

		<u>Total</u>	
	<u>TOTAL</u>	<u>Foreign</u>	<u>Local</u>
1. Temporary	68,227	51,990	16,237
2. Building	2,000,533	1,521,010	479,523
3. Supervisor	51,600	51,600	-
4. Mechanical	90,933	63,653	27,280
5. Electrical	114,576	80,203	34,373
6. Supervisor	16,500	16,500	-
7. Dispatch	270,000	270,000	-
8. Transport	1,319,887	1,217,480	102,407
9. General Expenses	234,237	178,497	55,740
Total (1 to 9)	4,166,493	3,450,933	715,560
10. Foundation	913,510	-	913,510
11. Outside	343,300	-	343,300
12. Cool Equip.	1,868,237	1,608,570	259,667
13. Meat Process	-	-	-
14. Palet	250,000	-	250,000
15. Forklift	133,333	133,333	-
TOTAL	7,674,873	5,192,836	2,482,037

COST FOR 2,000 TON COLD STORAGES

(Unit: L.E.)

1. Temporary	72,000	14,400	57,600
2. Building	1,299,000	1,039,200	259,800
3. Supervisor	51,600	51,600	-
4. Mechanical	87,000	60,900	26,100
5. Electrical	112,200	78,600	33,600
6. Supervisor	16,500	16,500	-
7. Dispatch	270,000	270,000	-
8. Transport	702,000	631,800	70,200
9. General Expense	156,600	62,600	94,000
Total (1 to 9)	2,766,900	2,225,600	541,300
10. Foundation	606,300	-	606,300
11. Outisde	343,300	-	343,300
12. Cool Equip.	1,133,570	995,237	138,333
13. Meat Process	1,200,000	1,020,000	180,000
14. Palet	130,000	-	130,000
15. Forklift	66,667	66,667	-
TOTAL	6,246,737	4,307,504	1,939,233

C. MAINTENANCE OF FACILITIES

C-1. Staffing Plan for Cold Storages,
Meat Processing Plants and Ice Plant

- a) Alexandria (6,000 Tons Cold Storage & Meat Processing)
Employees (for 5 rotations of cold storage capacity per year)

Manager ----- 1*

Administration

Dept.	:	Chief ----- 1	Cargo sect. ----- 1
		Inspecting sect. --- 1	General Aff. ----- 1
		Accounting sect. --- 1	Assist. ----- 2
		Total: 7*	

Operation Dept.:	:	Chief ----- 1	Scavenge sect. --- 2
		Cold sect. ----- 20	Meat distrib.
		(Foreman 2	sect. ----- 15(1+14)
		Worker 18)	
		Total: 38 (4* + 34)	

Engineering

Dept.	:	Chief ----- 1	Electric sect. --- 1
		Mechanical sect. --- 6	
		(2 x 3 shifts)	
		Total: 8*	

Meat Process. Dept.:	:	Total : 74 (4* + 70)
Guard man	:	Total : 6 (2 x 3 shifts)
Grand Total	:	<u>123 persons</u> (24* + 110 worker)

- b) Port Said-Sherif (3,000 Tons Cold Storage)

Employees (for 5 rotations of cold storage capacity per year)

Manager ----- 1

Administration:	:	Chief ----- 1	Cargo Sect. ----- 1
		Inspect Sect.- 1	General Aff. ----- 1
		Account ----- 1	Assist. ----- 2
		Total 7	

Operation	:	Chief ----- 1	Scavenge ----- 2
		Cold St. ----- 10	
		Total 13 (2 + 11)	

e) Cairo-Ghamra (3,000 Tons Cold Storage)

Employees (for 10 rotations of cold storage capacity per year)

Manager ----- 1*

Administration:	Chief ----- 1	Cargo Sect. ----- 1
	Inspect. Sect. 1	General Aff. ---- 1
	Account. Sect. 1	Assist. ----- 2
	Total 7*	

Operation	:	Chief ----- 1	
		Cold Storage Sect. -- 20	(2 + 18)
		Scavenge Sect. 2	
		Total 23 (3* + 20)	

Engineering	:	Chief ----- 1	
		Mechanical---- 6	(2 x 3 shifts)
		Electric ----- 1	
		Total 8*	

Guard man: 6 (2 x 3 shifts)

Grand Total: 45 persons (19* + 26)

f) Cairo-Ramada (3,000 Tons Cold Storage & Meat Process)

Employees

Manager ----- 1

Administration:	Chief ----- 1	Cargo Sect. ----- 1
	Inspect. Sect. 1	General Aff. ----- 1
	Account. ----- 1	Assist. ----- 2
	Total 7	

Operation	:	Chief ----- 1	Scavenge ----- 2
		Cold St. ---- 20	(2 + 18)
		Meat Dist. -- 15	(1 + 14)
		Total 38 (4 + 34)	

Engineering	:	Chief ----- 1	Electric ----- 1
		Mechanical --- 6	(2 x 3 shifts)
		Total 8	

Meat Process : Total 74 (4 + 70)

Guard man : Total 6 (2 x 3 shift)

Grand Total : 134 persons (24 + 110)

g) Alexandria (100T/day Ice Making)

Employees

Manager ----- 1

Operation : Chief ----- 1
Ice harvesting ---- 9 (3 x 3 shift)
Ice storage ----- 6 (2 x 3 shift)
Ice distrib ----- 4
Total 20 (1 + 19)

Engineering : Chief ----- 1
Electric ----- 1
Mechanical ----- 6 (2 x 3 shift) Total 8

Office : Chief ----- 1
Officers ----- 3 Total 4

Grand Total : 33 persons (14 + 19)

Table C-1 Operation and Maintenance Cost

a) Alexandria-El Dekihla (6,000 T Cold Storage & Meat Processing)

<u>Classification</u>	<u>Purpose</u>	<u>Unit Price</u>	<u>Qty/year</u>	<u>Sub-total LE/year</u>
Personnel Expenses	Office workers & Engineers	85 LE/man/month	24 men x 12 months	24,480
	Workers	50 LE/man/month	110 men x 12 months	66,000
Electric Charges	Motors & Lights	0.035 LE/KWH	3,572 x 10 ³ KWH	125,020
Water Charges	Meat Processing, Refrigerating Machine, & Miscellaneous	0.025 LE/m ³	42,000 m ³	1,050
Oil	Boiler for Meat Processing	30 LE/KL	336 KL	10,080
Vinyl Bag	Meat Processing	0.02 LE/Bag	75 x 10 ⁵	150,000
Maintenance & Repairing Charges	Cold Storage			36,000
	Meat Processing			36,000
Miscellaneous Expenses			about 3% of above	13,370
<u>Total</u>				<u>462,000</u>

Table C-2 Operation and Maintenance Cost

b) Port Said-Sherif (3,000T Cold Storage)

<u>Classification</u>	<u>Purpose</u>	<u>Unit Price</u>	<u>Qty/year</u>	<u>Sub-total LE/year</u>
Personnel Expenses	Office workers & Engineers	85 LE/man/month	18 men x 12 months	18,360
	Workers	50 LE/man/month	17 men x 12 months	10,200
Electric Charges	Motors & Lights	0.035 LE/KWH	1,509 x 10 ³ KWH	52,815
Water Charges	Refrigerating Machines	0.025 LE/m ³	9,000 m ³	225
Maintenance & Repairing Charges				18,000
Miscellaneous Expenses			about 3% of above	2,900
<u>Total</u>				<u>102,500</u>

Table C-3 Operation and Maintenance Cost

<u>Classification</u>	<u>Purpose</u>	<u>Unit Price</u>	<u>Q'ty/year</u>	<u>Sub-total LE/year</u>
c) Port Said-Abbas (2,000T Cold Storage)				
Personnel Expenses	Office workers & Engineers	85 LE/man/month	18 men x 12 months	18,360
	Workers	50 LE/man/month	14 men x 12 months	8,400
Electric Charges	Motors & Lights	0.035 LE/KWH	1,240 x 10 ³ KWH	43,400
Water Charges	Refrigerating Machine & Miscellaneous	0.025 LE/m ³	7,400 m ³	185
Maintenance & Repairing Charges				14,500
Miscellaneous Expenses			about 3% of above	2,555
<u>Total</u>				<u>87,400</u>

Table C-4 Operation and Maintenance Cost

<u>Classification</u>	<u>Purpose</u>	<u>Unit Price</u>	<u>Qty/year</u>	<u>Sub-total LE/year</u>
d) Suez (3,000T Cold Storage)				
Personnel Expenses	Office workers & Engineers Workers	85 LE/man/month 50 LE/man/month	18 men x 12 months 17 men x 12 months	18,360 10,200
Electric Charges	Motors & Lights	0.035 LE/KWH	1,509 x 10 ³ KWH	52,815
Water Charges	Refrigerating Machines	0.025 LE/m ³	9,000 m ³	225
Maintenance & Repairing Charges				18,000
Miscellaneous Expenses			about 3% of above	2,900
<u>Total</u>				<u>102,500</u>

Table C-5 . Operation and Maintenance Cost

e) Cairo-Ghamra (3,000T Cold Storage)

<u>Classification</u>	<u>Purpose</u>	<u>Unit Price</u>	<u>Q'ty/year</u>	<u>Sub-total LE/year</u>
Personnel Expenses	Office workers & Engineers	85 LE/man/month	19 men x 12 months	19,380
	Workers	50 LE/man/month	26 men x 12 months	15,600
Electric Charges	Motors & Lights	0.035 LE/KWH	1,509 x 10 ³ KWH	52,815
Water Charges	Refrigerating Machines & Miscellaneous	0.025 EL/m ³	9,000 m ³	225
Maintenance & Repairing Charges				18,000
Miscellaneous Expenses			about 3% of above	3,180
<u>Total</u>				<u>109,200</u>

Table C-6 Operation and Maintenance Cost

<u>Classification</u>	<u>Purpose</u>	<u>Unit Price</u>	<u>Q'ty/Year</u>	<u>Sub-total LE/year</u>
f) Cairo-Ramada (3,000T Cold Storage and Meat Processing)				
Personnel Expenses	Office workers & Engineers	85 LE/man/month	24 men x 12 months	24,480
	Workers	50 LE/man/month	110 men x 12 months	66,000
Electric Charges	Motors & Lights	0.035 LE/KWH	3,094 x 10 ³ KWH	108,290
Water Charges	Meat Processing, Refrigerating Machines & Miscellaneous	0.025 LE/m ³	37,870 m ³	945
Oil	Boiler for Meat Processing	30 LE/KL	336 KL	10,080
Vinyl Bag	Meat Processing	0.02 LE/Bag	75 x 10 ⁵	150,000
Maintenance & Repairing Charges	Cold Storage			18,000
	Meat Processing			36,000
Miscellaneous Expenses			about 3% of above	13,205
<u>Total</u>				<u>427,000</u>

Table C-7 Operation and Maintenance Cost

g) Alexandria (100T Ice Making and Ice Storage)

<u>Classification</u>	<u>Purpose</u>	<u>Unit Price</u>	<u>Q'ty/year</u>	<u>Sub-total LE/year</u>
Personnel Expenses	Office workers & Engineers	85 LE/man/month	14 men x 12 months	1,190
	Workers	50 LE/man/month	19 men x 12 months	950
Electric Charges	Motors & Lights	0.035 LE/KWH	3,358 x 10 ³ KWH	117,530
Water Charges	Raw Water			
	Refrigerating Machine & Miscellaneous	0.025 LE/m ³	66,000 m ³	1,650
Maintenance & Repairing Charges				25,000
Miscellaneous Expenses			about 3% of above	4,680
<u>Total</u>				<u>151,000</u>

C-9. Training Program

1. Outline of training program

The training program shall cover the following eight major items including refrigerating techniques and so forth, numbered (I), (II), (III-i), (III-ii), (IV-i), (IV-ii), (IV-iii) and (V), as described in the following paragraphs.

The training program will be conducted in consideration of the trainees' ability and experience, and accordingly the training time and program will be changeable depending on the circumstances.

(I) Refrigeration techniques (189 hrs - 27 days)

Lecturer: University Professor of refrigeration engineering or equivalent expert,

(II) Operation and management (35 hrs - 5 days)

Lecturer: Managers in charge of the respective plants,

(III) On-the-job training in the processing plants

Trainer: Chief engineers in the relevant plants,

(i) Refrigeration equipment (203 hrs - 20 days)

(ii) Meat processing techniques (140 hrs - 20 days)

(IV) On-the-job training at storages

Trainer: Section chief of related plants to meet the training purposes

(i) Cold storage (168 hrs - 240 days)

(ii) Ice plant (140 hrs - 20 days)

(iii) Meat processing plant (301 hrs - 43 days)

(V) Training at construction sites (throughout the construction period)

Trainer: Construction supervisors at the respective sites

Implementation of training program

◦ Cold storage

<u>Trainees</u>	<u>Program to be applied</u>
Administration officers	(I), (II) and (III-i)
Mechanics	(I), (II), (III-i) and (IV-i)
◦ Meat processing	(II), (III-ii) and (IV-iii)
◦ Ice-making	(II), (III-i) and (IV-ii)

2. Lecture on refrigeration techniques
Programs (I) and (II)

1). Basic knowledge on refrigeration

7 hrs x 3 days = 21 hrs.

Temperature

Heat and calory

Specific heat

Entarpy and entropy

Refrigeration capacity

Pressure

Laws of heat dynamics

Laws of gas

Metamorphose of gas

Properties of liquefied gas

Heat dynamic cycle

2). Refrigerant

3 hrs x 1 day = 3 hrs

Type of refrigerant

Physical properties of refrigerant

Chemical properties of refrigerant

Specific features and use of refrigerant

Properties as pollutant

Toxicity and explosiveness

Corrosiveness

Properties of ammonia

First-aid for ammonia-polluted (catalyst) human body.

3). Brine

4 hrs x 1 day = 4 hrs

Types and characteristics

Properties of calcium-chloride brine

Properties of Sodium-chloride brine

4). Compression refrigeration cycle

7 hrs x 3 days = 21 hrs

Mollier's diagram

Adiabatic compression, adiabatic expansion

Isobaric change

Coefficient of performance

Subcooled refrigeration cycle

Super heated refrigeration cycle

Wet compression refrigeration cycle

Two stage compression refrigeration cycle

5). Function and mechanism of main refrigeration equipment

7 hrs x 4 days = 28 hrs

Multi-cylinder high speed compressor

Screw compressor

Two-staged compound compressor

Oil separator

Condenser
Evaporative condenser
Receiver
Water pump
Unit cooler type evaporator
Herringbone type evaporator
Thermostatic expansion valve
Fan
Safety devices
Automatic controls
Piping and fitting

6). Security of refrigeration plant

7 hrs x 2 days = 14 hrs

Origin of accident
Plan of security
Regulation of security
Education of security
Test for security
Strength of refrigeration equipment

7). Heat insulation and damp moisture

7 hrs x 1 day = 7 hrs

Thickness of insulation materials
Materials for insulation
Heat conductivity of insulation materials

8). Cold storage

7 hrs x 1 day = 7 hrs

Storage capacity
Loading/unloading method
Refrigeration method and cooling temperature
Heat insulation
Heat insulation doors and air curtains
Refrigeration equipment
Defrosting devices
Refrigeration load

9). Ice plant

7 hrs x 1 day = 7 hrs

Method of ice making

Crystal ice

Ice making equipment

Relationship between freezing time and brine temperature

Wind-up and taking-out of ice

10). Ice storage

7 hrs x 1 day = 7 hrs

Ice storage temperature

Ice storage capacity

cooling method

11). Basic knowledge on air conditioning

7 hrs x 3 days = 21 hrs

Humidity

Air flow

Air cleaning

Air conditioning system

Psychrometric chart

Calculation of cooling or heating load

Mechanism of air conditioner

12). Electric circuit of refrigeration and air conditioning

7 hrs x 5 days = 35 hrs

Fundamental knowledge of electricity

Induction motor

Distributing system

Wiring diagram

Sequence diagram

Symbols

Actual control circuit

13). Diesel generator

7 hrs x 2 days = 14 hrs

Mechanism and function

Operation and maintenance

Parts

3. Major subjects of lecture in operation and management of ice plant and cold storages (program (II))

7 hrs x 5 days = 35 hrs

1. Condition of cold storage
2. Efficiency of cold storage
3. Organization and staffing
4. Office work for receiving products
5. Office work of storage period
6. Office work for forwarding products
7. Inspection
8. Budgeting for maintenance works
9. Sanitary control

4. Program of on-the-job training

1). On-the-job training in manufacturing factory (III-i),
(III-ii)

Compressor 7 hrs x 10 days = 70 hrs

Condenser

Oil separator 7 hrs x 2 days = 14 hrs

Receiver

Unit cooler 7 hrs x 2 days = 14 hrs

Water pump 7 hrs x 1 day = 7 hrs

Arcwelding 7 hrs x 2 days = 14 hrs

Gas welding and cutting 7 hrs x 3 days = 21 hrs

Air conditioner 7 hrs x 3 days = 21 hrs

Pressure test and leakage test 7 hrs x 1 day = 7 hrs

Diesel generator 7 hrs x 5 days = 35 hrs
Meat processing facilities 7 hrs x 20 days = 140 hrs
and machines (C-ii)

2). On-the-job training in the cold storage (IV-i)

7 hrs x 32 days = 224 hrs

Operation of refrigeration machine 7 hrs x 5 days = 35 hrs
Loading and unloading 7 hrs x 5 days = 35 hrs
Control of cargo 7 hrs x 5 days = 35 hrs
Office works 7 hrs x 2 days = 14 hrs
Inspection 7 hrs x 1 day = 7 hrs
Sanitation 7 hrs x 2 days = 14 hrs
Maintenance of facilities 7 hrs x 4 days = 28 hrs

3) On-the-job training in ice plant (IV-ii)

7 hrs x 20 days = 140 hrs

Operation of refrigerating machine 7 hrs x 3 days = 21 hrs
Ice harvesting works 7 hrs x 5 days = 35 hrs
Ice storage and forwarding works 7 hrs x 5 days = 35 hrs
Office works 7 hrs x 2 days = 14 hrs
Maintenance of facilities 7 hrs x 5 days = 35 hrs

4). On-the-job training in meat processing plant (IV-iii)

7 hrs x 43 days = 301 hrs

Operation of facilities 7 hrs x 7 days = 49 hrs
Daily works 7 hrs x 20 days = 140 hrs
Inspection 7 hrs x 3 days = 21 hrs
Sanitation 7 hrs x 3 days = 21 hrs
Maintenance of facilities 7 hrs x 10 days = 70 hrs

5) On-the-job training at construction site in Egypt (V)

Construction of insulation panel
Fitting of insulation doors
Installation of compressor, cooler, condenser, ice tank,
meat processing facilities, etc.

Piping works

Insulation for piping

Electric wiring of automatic control system

Pre-operation check and adjustment of automatic control devices and meat processing facilities

Charging of ammonia

Leakage check of refrigeration facilities and piping

Trial operation of facilities

